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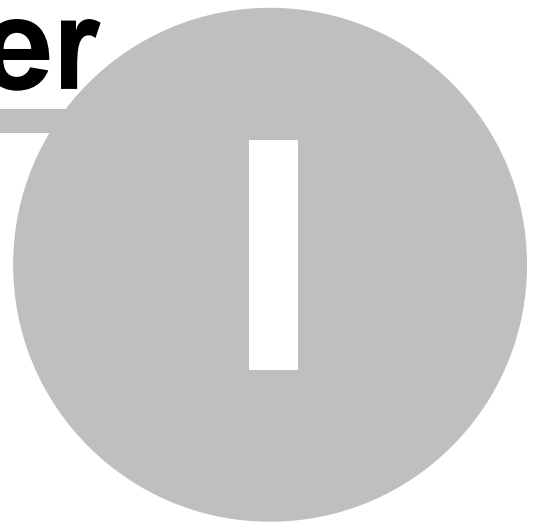
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Chapter



1 Introduction

Introduction Semi Automatic SM902

Version 7.0 for Windows 2000 / XP

Almost all Hard- and Software descriptions, mentioned in these instructions, are also registered trademarks and should be considered as such. On the whole, Fritsch follows the pattern set by the manufacturers as far as descriptions are concerned.

A top class product today not only has to be made very well it also needs to produce excellent results; software, too, is expected to fit to customers' requirements.

The software of the SM902 machine has always been pace leading edge and in the current version 7.0 has been again extended and improved.

This chapter introduces the changes and helps in finding the way round the whole of the software.

1.1 News

The new version of the SM902 software features the following enhancements:

- **Matrix Feeder**
Beside the known feeders there is now the possibility to use matrix feeders.
- **Virtual View**
With the Virtual View it is possible to follow the placement process on the monitor.
All important information can be viewed there.

1.2 Structure of the Manual

This SM902 manual provides a step by step guide to working with your Semi Automatic Machine. The chapters are arranged as follows:

Chapter 2

describes the installation of the software, which is followed by brief descriptions of individual areas of the program.



The assembly of the Semi Automatic Machine and its feeders is described in the accompanying *Installations Handbook SM902*.

Chapter 3

The Chapter „How to ... ?“ helps in easily learning individual tasks concerning the Semi Automatic Machine. Those not familiar with operating the SM902 should follow each sections until the first board is populated.

Chapter 4

describes the menu points and their meanings. Information for each menu point is contained here.

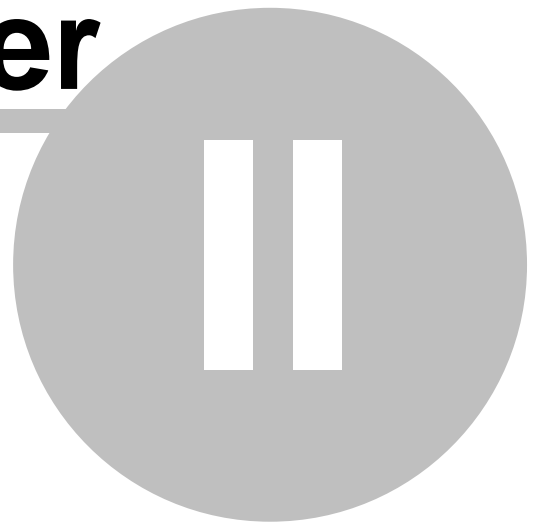
Appendix

contains some topics that have further information to special areas of the software.

1.3 Further Information

Whenever the machine is used the Online Help is available. It contains the same information that can be found in this handbook. This help can be accessed by selecting the menu command Help/Index.

Chapter



2 Installation

This chapter contains the basic options for installing the control software. Also a step by step guide to the program and to first using it and an overview of the individual functions.

2.1 System Requirements

In order to guarantee a correct working with the SM902 software the following system requirements must be met:

- IBM compatible PC mit Pentium Processor
- 128 MB Memory, recommended 256 MB
- 8 MB free disc space
- Serial ports:
 - 1 serial port for the semi automatic machine
 - 1 serial port for up to 5 carousels or paternoster (if available)
 - 2 serial ports for the auto dispenser (if available)
 - 1 serial ports for the tester (if available)
- Windows 98, Windows 2000, Windows XP

2.2 Before you start

Windows, in contrast to DOS, is particularly sensitive in terms of addressing serial interfaces. An incorrect setting can lead to serious problems.

Although Windows makes the basic settings automatically, occasionally errors may occur. Please ensure that all interface ports are set up correctly before attempting to install the software.

2.3 Installation of SM902

The Semi Automatic Pick and Place Machine is supplied partially assembled. To ensure that the machine will function properly and to facilitate its rapid assembly please follow these point carefully. All required fixing materials are included in the packaging of the placement arm.

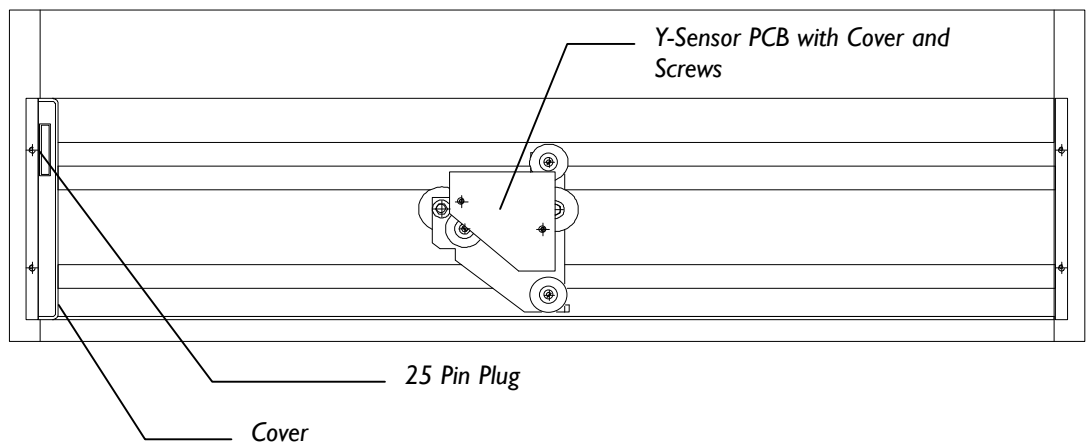
1. Removal of Cover:

Remove the two countersink screws from the cover for the base plate/bridge connector at the inside of the right hand side plate of the bridge unit.

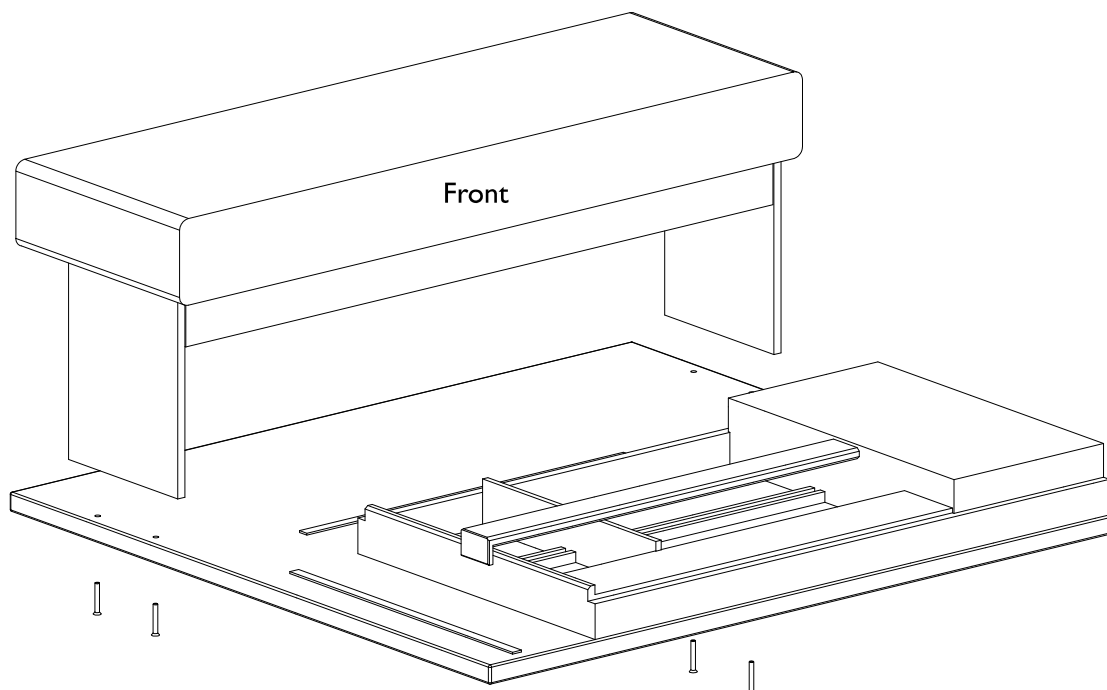
2. Folding back of Y-Sensor PCB:

Remove the two Allen screws(1) from underneath the carriage. Please do not unplug the connector.

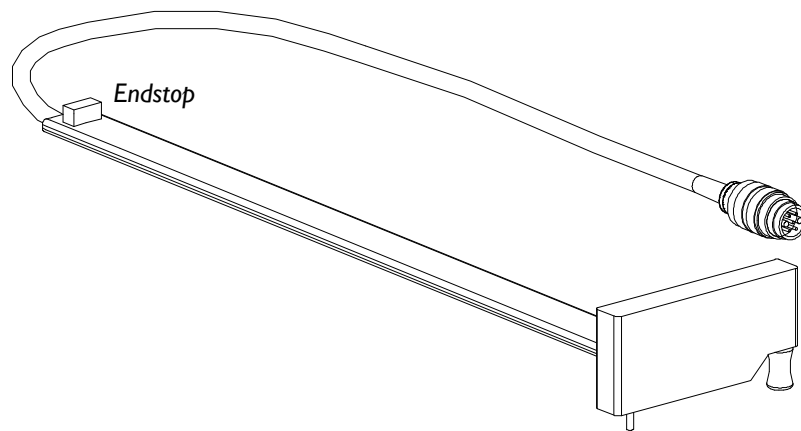
View from below the bridge unit



3. Place the bridge unit on the base plate in such a way that the four countersink screws M4x25 can be fitted from below.

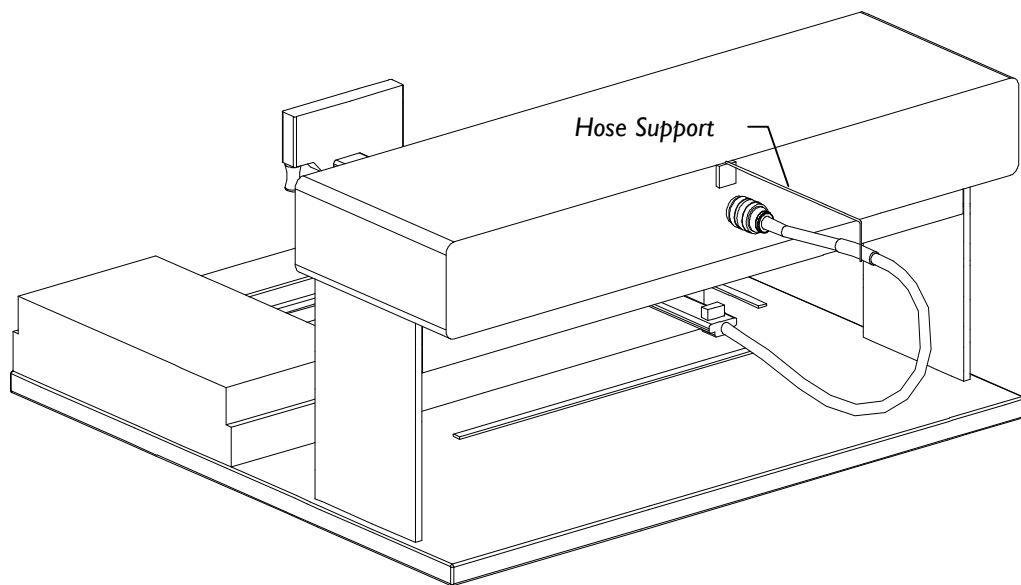


4. Remove the endstop of the pick and place arm by means of one of the enclosed Allen keys.



5. Carefully insert Pick and Place Arm from the front into the guide rollers of the carriage. Replace endstop. Insert round plug into the corresponding socket at the back of the bridge unit and screw in retaining ring.

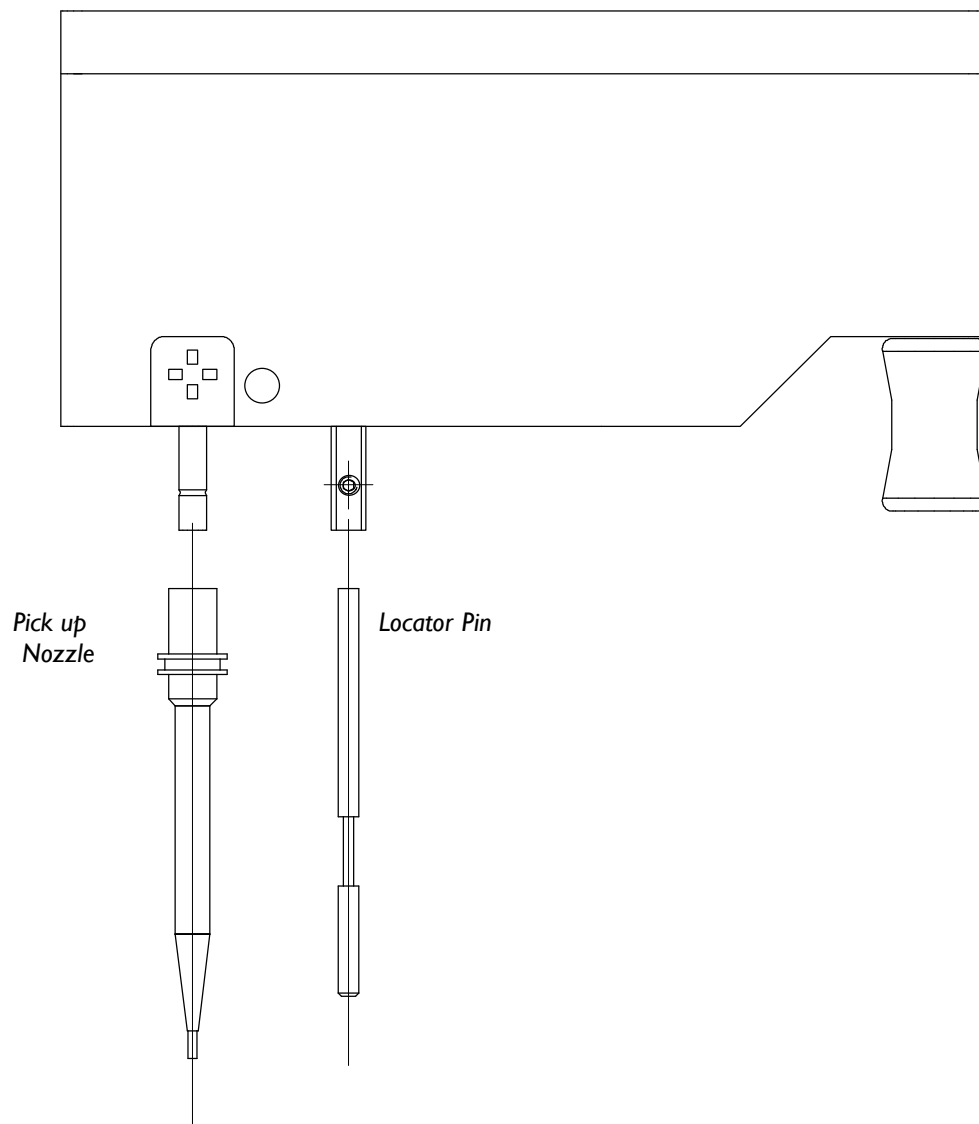
6. Fit hose support as shown in illustration.



7. Refit Y-Sensor PCB and its cover (please also see page 6, point 2.)

8. Connect 25-pin connector between base plate and bridge unit (please page 6, point 1.). Then refit cover for connector.

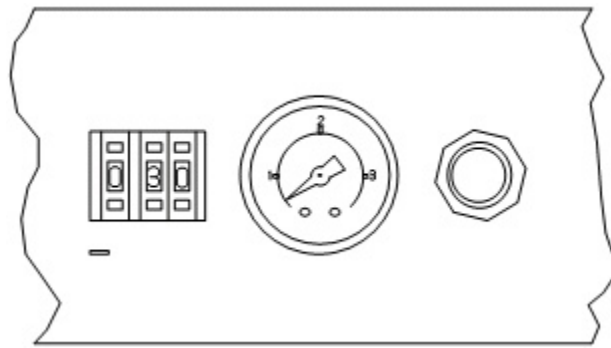
9. The supplied pick up nozzles can be stored in the nozzle rack attached to the left hand side plate of the bridge unit. The retracting locator pin should be inserted into its holder and held in place by tightening the grubscrew with the smallest of the Allen keys provided.



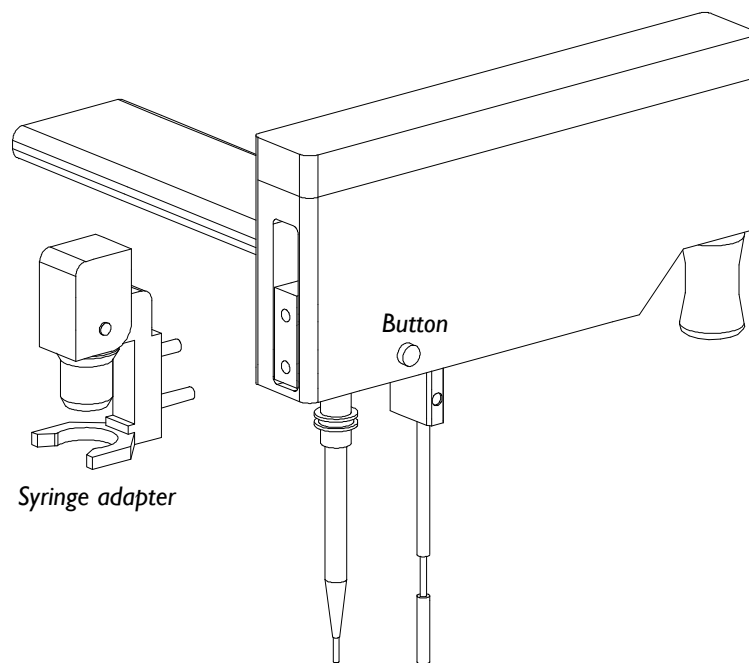
The transport immobilizers (marked with red dots) must be removed before the machine is switched on.

2.4 Startup of the Dispensing Equipment (Option)

The quantity of solder paste or adhesive to be dispensed is determined by: the adjustable time interval, during which pressure is applied, the adjustable pressure, the different nozzle diameters and the viscosity of the medium to be dispensed. Experience shows that good results can be achieved with a time of 0.30 seconds (setting:30) and a pressure of 2 bar.



1. Insert the syringe adapter into the left hand side of the placement head (see illustration).



2. By pressing the release button at the front of the placement head (see illustration) the syringe adapter is lowered and brought into operation. When not in use the adapter is pushed up until engaged in the upper position.

3. Changing of the Syringe:

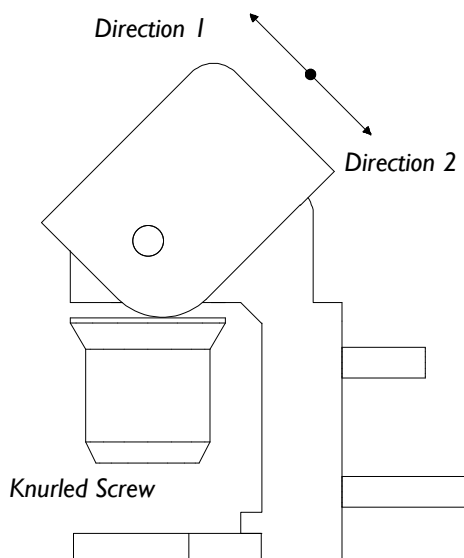
After a syringe has been attached to the syringe adapter for some time the expanding rubber seal can stick to the inside of the syringe wall. Once the clamping lever is released (please see illustration: direction 1 = release, direction 2 = clamp), the syringe needs to be gently rocked from side to side to break the seal between syringe and adapter. The syringe can then be pulled from the adapter. The pressure available from the rubber seal can be adjusted by rotating the knurled screw (please see illustration) below it.

When a syringe is not to be used for a considerable time it is advisable to remove the dispensing nozzle and to replace it with the enclosed cap. The useful life of the contents of the syringe can be extended by storing it vertically in a cool place.

Our dispensing nozzles have chamfered tips to allow solder paste or adhesive to be dispensed freely onto PCBs.

The dispensing nozzles are colour coded:

| Color | light blue | black | blue | yellow | pink |
|---------|------------|---------|---------|---------|---------|
| PartNo. | 931.006 | 931.007 | 931.008 | 931.009 | 931.013 |
| ID Ø mm | 0,40 | 0,50 | 0,60 | 0,75 | 1,00 |
| OD Ø mm | 0,60 | 0,70 | 0,80 | 0,95 | 1,30 |



2.5 Software Installation

The SM902 program for Windows and the Installation Program are both Windows applications. This means that Windows must already be loaded on the computer before attempting to install this control program. The installation program establishes the required sub directories on the hard disk.

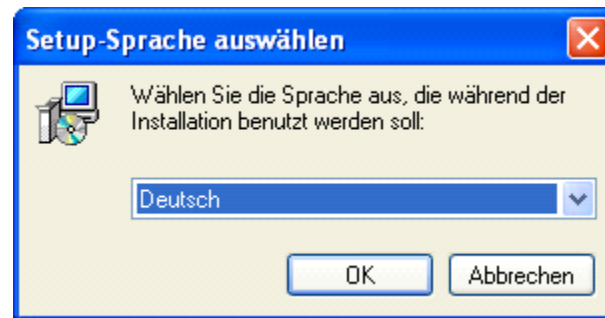
The installation program is largely self-explanatory. the following is a description of all the steps that need to be carried out to install SM902 for Windows.

2.5.1 Installation under Windows

1. Please insert the installatoin CD into the CD drive.
2. The setup program should launch automatically.
3. Otherwise open the explorer and start SM902Setup.exe.
4. Follow the instructions of the Installation Program.

Installation Program

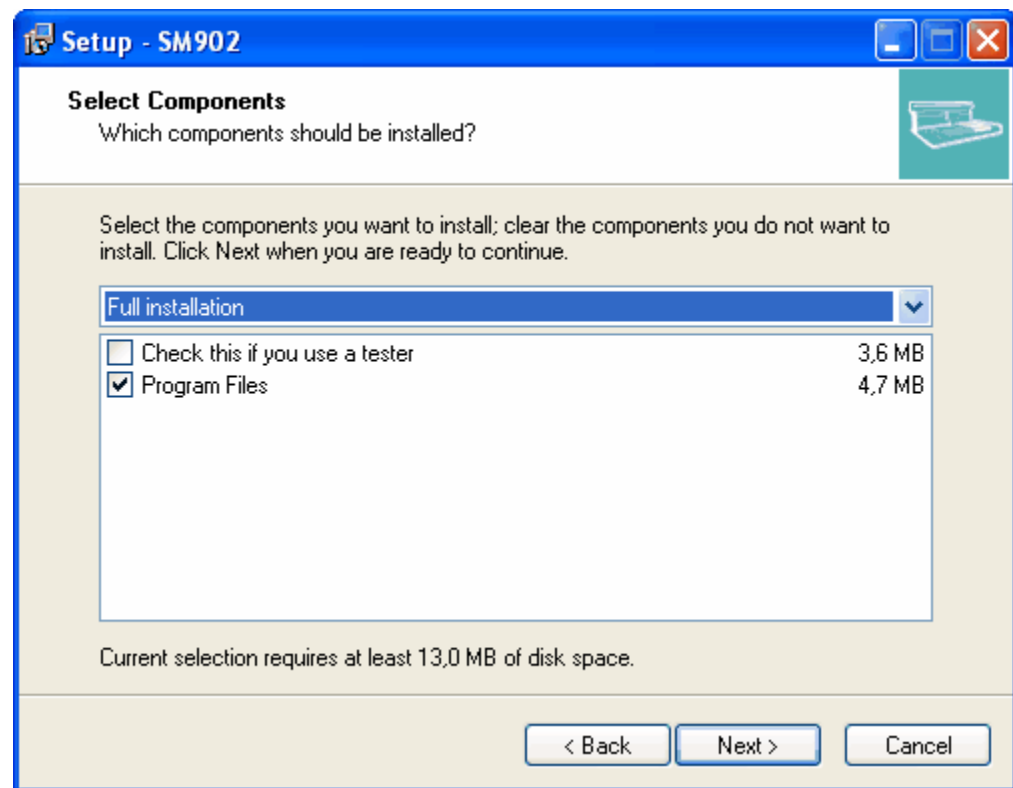
After starting the Installation Program please choose your language which you want for the software.



The default language will automatically be chosen depending on you operating system.

Hit OK to proceed to the next dialog which you skip by clicking Continue

The next dialog shows you some options from which you can choose. The Program Files have always to be installed. They contain the basic files for the software. If you use a tester, please check the option for the tester. This will install all necessary components which are needed to communicate with the tester.



Any alternative path can be selected by clicking „browse“. This facility allows you to install the software in, for example, a network destination.



The software is not network compatible. Although it can be installed onto a network drive, only one user can make use of it at the same time.

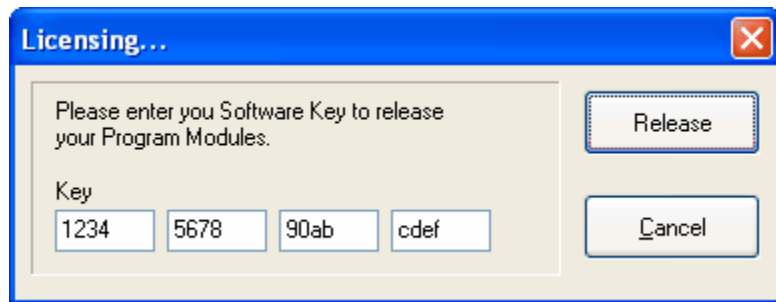
After entering the path the next phase commences, during which the program data is copied into the target directory.

This completes the installation of the program.

2.6 First Start

When the „SM902“ program is first started any missing information is requested.

To register the software please enter the alphanumeric key supplied when it was purchased in the „Licensing“ window.



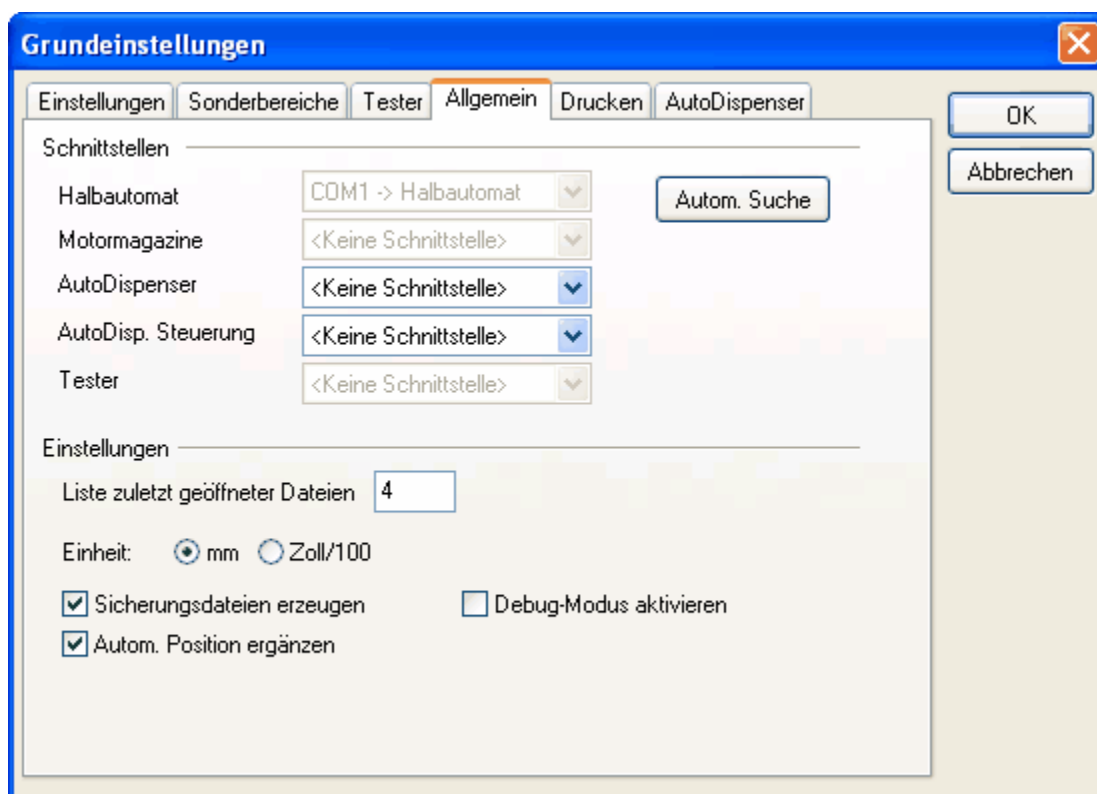
Please enter your key and use „release“ to activate your program module.



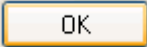
Only after successful entry of the software key can the program be properly used. After first start the supplied software key **must** be entered.

2.7 Configure Interface Ports

Now follows the Options Dialogue Box, where interfaces can be allocated. Only ports recognized by the system will be indicated in the selection boxes.



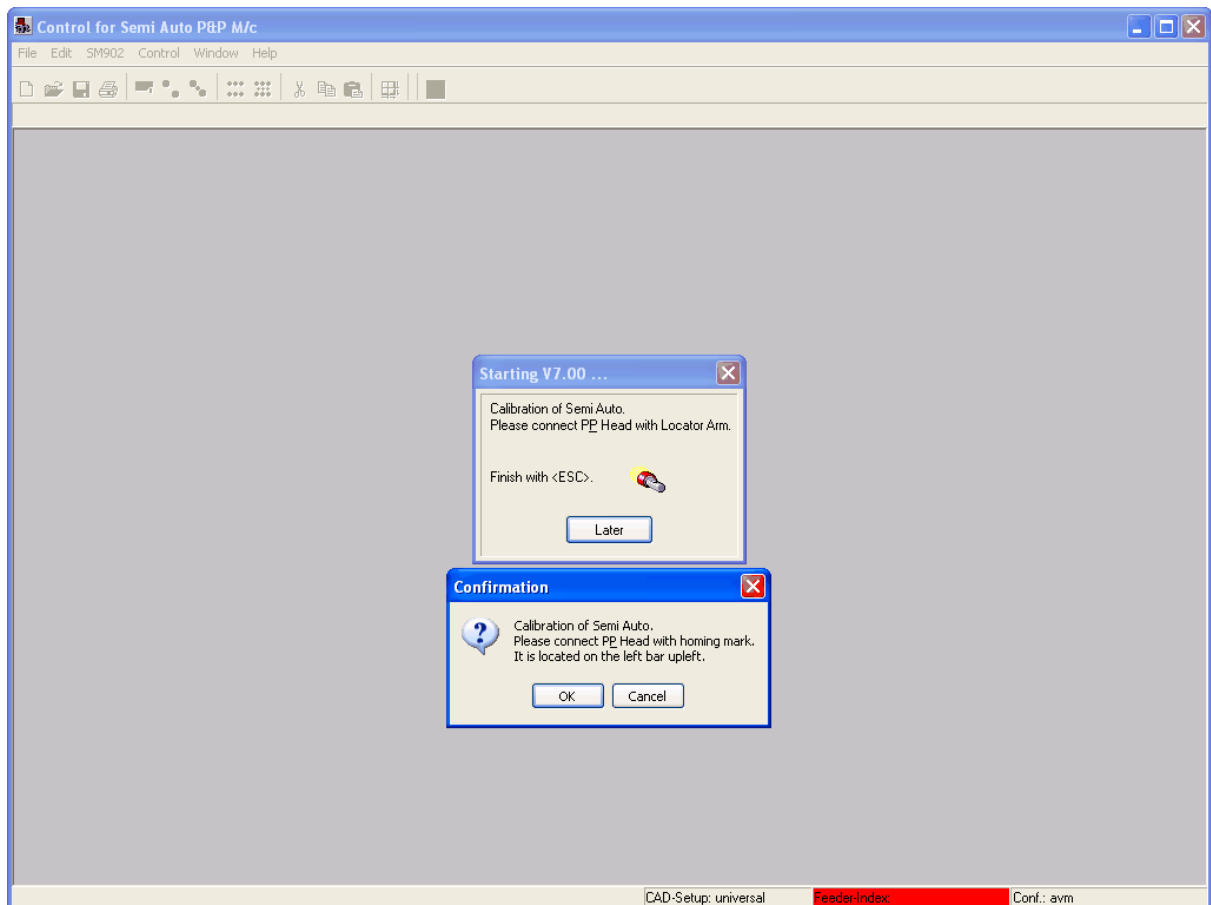
With the Button **Autom. Suche** you can automatically search for the interfaces of the semi automatic machine, the dynamic feeders and the tester, if available.

The interfaces für the AutoDispenser and the AutoDispenser Control must be configured manually. Confirm the settings by pressing the  Button.

After assigning the interfaces the program will be automatically terminated because the new settings take first place after restarting the software.

2.8 Program Start

Please switch on the semi automatic machine and start the control program „SM902“.



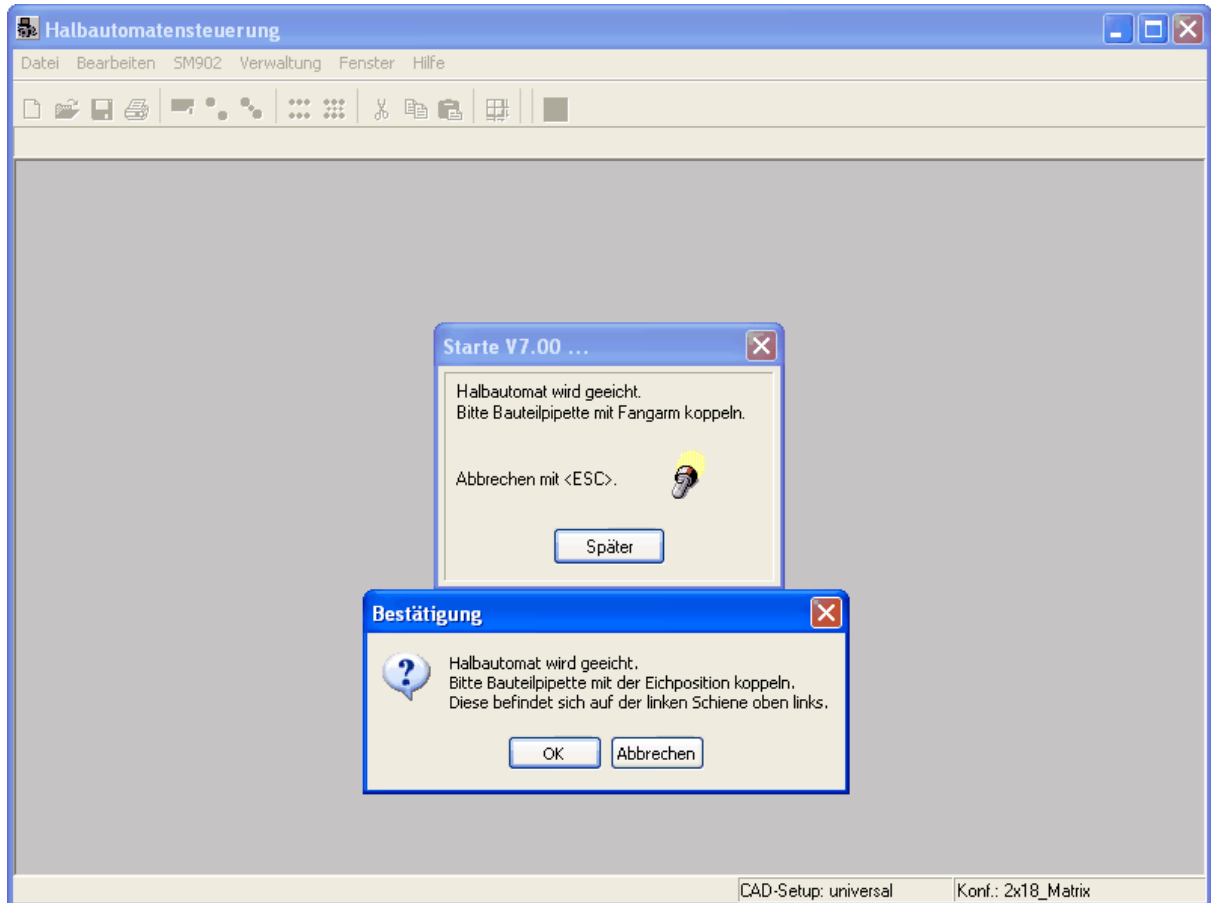
Before all functions of the machine are available it must be calibrated. Therefore connect the head pin with the calibration hole in the upper left of the left bar. Then press the OK button. The calibration is confirmed with a signal tone.



If you click on Cancel, the software will terminate.

2.9 Program Start

Please switch on the semi Auto Machine, wait for it to complete its Locator Arm calibration movement and then start the control program „SM902“.

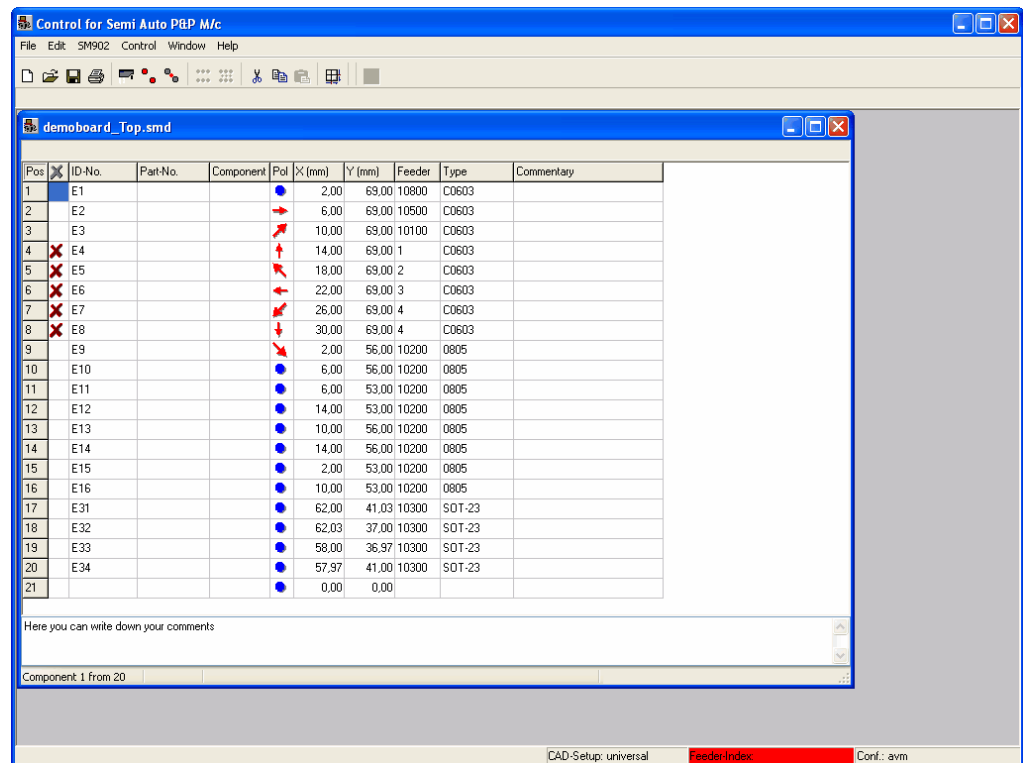


Before all functions of the program are available the machine needs to be further calibrated. For this purpose please enter the Locator Pin of the Placement Head into the eye of the Locator Arm. The software recognizes this action and automatically matches the top and bottom measuring systems as soon as it detects the downward movement of the head.

By clicking „later“ this calibration is be skipped at this point, but can be carried out afterwards from within the „Pick & Place“ mode by using the command „calibration“.

2.10 Program User Interface

The new program user interface provides for a rapid and simple operation of the pick and place program.



The program is arranged in such a way that several placement files can be processed at the same time. For example sections of files can be transferred to another file. the placement windows can be tailored to individual requirements, the width of columns can be altered. In addition complete columns can be hidden.

Each file has a comments field, where datum points or other relevant features or remarks can be recorded. There is also a comments field associated with each placement line, allowing additional information to be entered.

2.11 Function Keys and Short Cuts

| | |
|-------------------|--------------------------|
| F1 | Help |
| F3 | Repeat Search |
| F4 | Edit Components |
| F5 | Start Placement |
| F6 | Adhesive Application |
| Shift + F6 | Solder Paste Application |

| | |
|------------|--|
| F7 | Accept the X-Y-Position of the Pick&Place Head (Feeder Configuration and Component Editing) |
| | Jump to any position during the Pick&Place process |
| F8 | Options |
| F9 | Change Nozzle |
| F11 | Move Motor Magazine (only while editing) |

| | |
|-----------------|------------|
| Ctrl + C | Copy |
| Ctrl + F | Search |
| Ctrl + V | Insert |
| Ctrl + X | Cut |
| Ctrl + Y | Delete Row |

2.12 Menu Description

There follows a brief description of the individual menus in the main window. Further details of the particular commands can be found in **Chapter 4 Program Description**.

Depending on the version of program some of the following menu point are not present or cannot be activated.

2.12.1 File

New

This button starts the „Teach“ process for a new placement program.

Open

This menu point activates the „Open“ dialogue of the program, which facilitates the loading of a file for Picking & Placing or editing.

Convert

This function is only active when the CAD Conversion CG948 module forms part of your software package.

With the CAD Conversion you can open a PP-File from your CAD-System and

convert it into a SMD-File for the FRITSCH Semi Auto Pick and Place SM902.

Close

Closes the current Pick & Place program without terminating the application. Any changes to the program can be saved.

Save

The saving menu saves the current program to the hard disk. If no file name has yet been specified this will have to be done now.

Save As

This menu enables the changing of a file name from an already existing file.

Properties

Shows the properties dialogue for the current Pick & Place File.

Print

With this menu point the current Pick & Place List, the Material List, the Rest placement list or the last state of the Test Protocol can be printed. The button always assumes the default choice of Pick & Place List.

Printer Setup

The Windows Printer Options can here be specified.

End

Terminates the program.

2.12.2 Edit

Please note that most of the points of this menu will not be available until a particular Pick&Place program has been loaded.

Cut, Copy, Paste

Editing functions for Pick&Place programs to cut, copy and paste rows.

Search (Ctrl+F)

This command allows the search for individual values within a Pick&Place program.

Repeat search (F3)

With this command you can search for further accurances of the value, entered in the search dialogue (see above).

Replace Values

Part and feeder numbers that have changed since establishing the program can be altered with this menu point.

Move Components

This command enables you, to shift all positions on the PCB by an offset. You may choose between two procedures: Enter an offset by using the keyboard (Absolute Value) or teach in the offset by using the placement head on the basis of one place position (By Component).

Calibrate

When the two measuring systems were not matched during the switch on procedure this calibration can be initiated here.

2.12.3 SM902**Component Editing (F4)**

Switches the program into Teach Mode. Existing files can now be edited in Teach Mode.

Start Pick & Place (F5)

This button switches to the Pick&Place mode.

Move Motor Magazine (F11)

Moves the motor magazine to the position of the marked component, provided that the assigned feeder is a motor magazine.

Dispensing ->**Adhesive Application (F6)**

If your machine is equipped with dispensing, this button takes it into the adhesive application mode.

Solder Paste Application (Shift+ F6)

If your machine is equipped with Series Dispenser Module, this button activates it.

2.12.4 Control**Feeder Coordinates ->**

Management of static feeder and motor magazines:

Open

Load an existing feeder configuration.

New

Create a new feeder configuration.

Edit

Edit an existing feeder configuration

Reset

Give a reset command to all connected motor magazines.

Feeder Index ->

Management of feeder index files:

Open

Load an existing feeder index.

New

Create a new feeder index.

Edit

Edit an existing feeder index.

Maintain Tolerance File

Library maintenance for placement tolerances relating to different component sizes.

Libraries ->

Opens the dialogs to maintain the following libraries:

- Component Library
- Norm Library
- User Library
- Adh. Library
- Dispenser Library

Options (F8)

This menu point allows the alteration of basic settings.

CAD-Setup

Opens the CAD-Setup-Dialog to establish the CAD conversion. This function is only active when the CAD Conversion CG948 module is part of your software package.

Authorisation

Excludes unauthorised persons from access to and altering system settings, when selected.

Settings ->**Language ->**

Sets the language to German or English.

System Password

Opens the password dialog for entering a new system password.

Dispensing Nozzle Calibration

Calibrating the Disp Nozzle or the Marker Pen (Offset between the Referenz Pointer and the Disp Nozzle or the Marker Pen).

Dispensing

Switches the Dispensing of Solderpaste or Glue on and off (Relevant for Testing the AutoDispenser).

Mechanic

Switches the Mechanic of the AutoDispenser on and off (Relevant for Testing the AutoDispenser).

2.12.5 Window

Cascading, Tile Vertically, Tile Horizontally, ...

These points affect the way several programs are displayed if more than one is open at a time.

Fit Window

This dialog is used to determine the way the columns are arranged.

2.12.6 Help

Contents (F1)

Opens the list of contents for the online help.

About...

Shows the Copyright information for the program. Also useful to determine what software version is running.

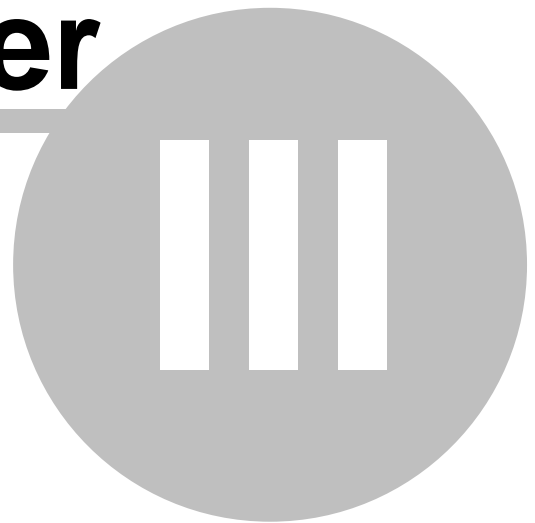
System info...

Information about the program. This can be useful in cases of trouble shooting.

Licence...

This menu point is used to enter software keys to release software modules for use.

Chapter

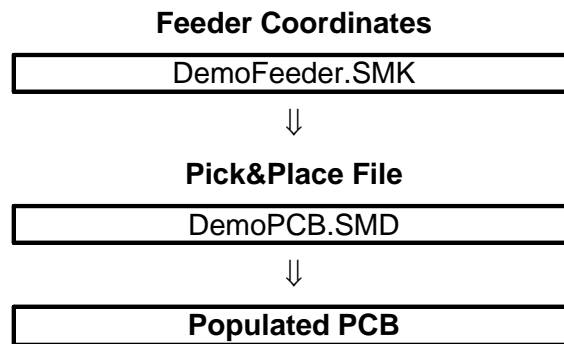


3 How to?

To provide an easy access to the use of the SM902 this chapter provides step by step guides to the most common questions. More details can be found in the corresponding menu descriptions.

3.1 How does the placement work?

To populate a PCB by using the SM902 the program requires the following information, i.e. files.



In the *Feeder Configuration* the positions of the individual feeders are defined. This information is important for the Semi Auto machine to ensure that only components from the correct feeder are used. When establishing a feeder configuration each feeder has an LED allocated to it, which later is used to identify it. A detailed description of the feeder configuration is contained in section *How do I configure feeders?*.

In the *Pick&Place file* information relating to individual components is stored, such as placement position, orientation and component name. This file can be made in one of two ways:

Teaching individual positions

This method involves manually „showing“ the machine where individual components go, while at the same time, possibly, assembling the first board. (Siehe *How do I program a new board?*).

CAD Conversion (Option)

This interface converts CAD data directly into SM902 Pick&Place files and is a very simple and reliable way of programming all necessary data. In addition this conversion guarantees 100% accuracy. (Siehe *How do I convert a CAD file?*)


3.2 How do I configure feeders?

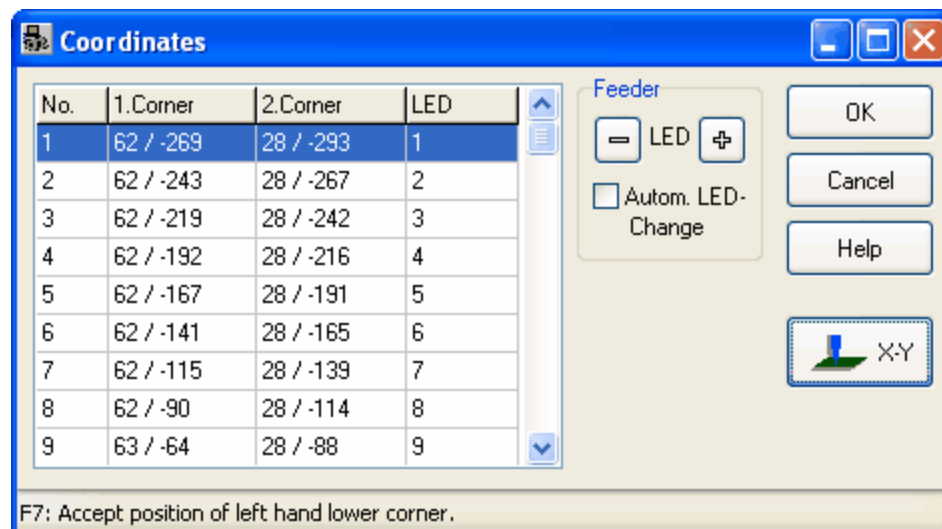
The Semi Auto Machine SM902 checks even before the pick up point that the correct component has been selected. For this reason the feeders have to have their co-ordinates recorded before a placement program is established


The SM902 saves all information under *Pick up Positions* of components in the *Feeder Co-ordinates File „SMK“*. This file contains the positional information of each feeder and their associated LED in its rail.

3.2.1 Feeder coordinates for stationary feeders


For the following steps please use the standard vacuum nozzle (tip diameter 1.3 mm).

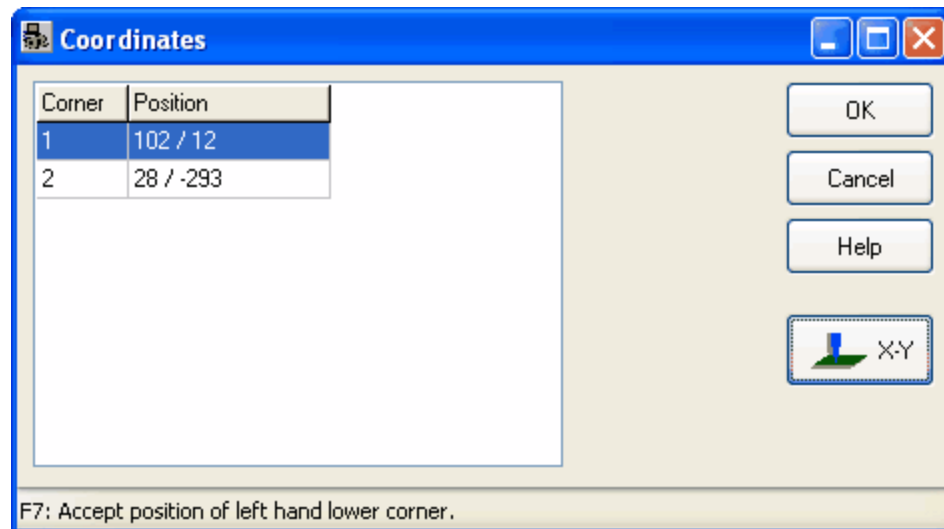
1. From the **Control** menu please select entry **Feeder Coordinates/New**.
2. Then enter the number of stationary feeders in use.
3. After entering the number of feeders (at least 1 feeder) only the button  needs to be clicked.




4. The dialog box has a row for each feeder, which in turn contains the coordinates and the number of the corresponding LED.
5. For registering the coordinates of the pick up area of a feeder please use the pick up nozzle and point at the lower left and then the upper right corner, in each case confirming the position by pressing **F7** or the button .
6. (Optional) Should the feeder position not be matched by the allocated LED, one can simply „slide“ the allocation by clicking the „+“ or „-“, button. Any following LEDs will be moved along automatically.

Beside the stationary feeders you can use a matrix feeder.

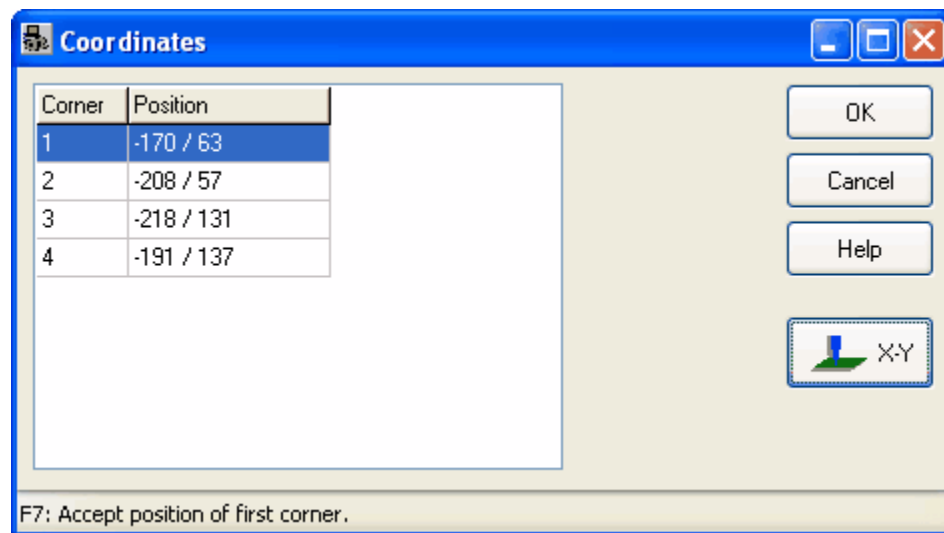
1. From the **Control** menu please select the entry **Feeder Coordinates/New**.
2. Then enter the number of rows and columns of the matrix in X- and Y-direction.
3. After entering the number of rows and columns please press the button .



4. The dialog box has 2 rows, which in turn contains the coordinates of the complete matrix.
5. For calculating the coordinates of the pick up area of a box please use the pick up nozzle and point at the lower left and then the upper right corner of the whole matrix feeder, in each case confirming the position by pressing **F7** or the button .

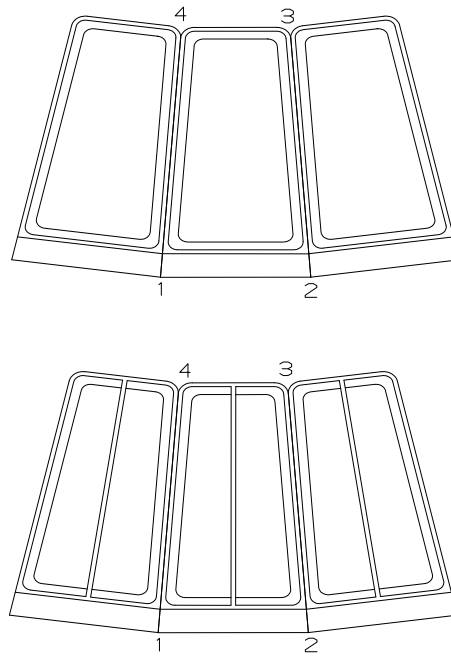
3.2.2 Feeder coordinates for motor magazines


For mass storage or paternoster magazines and carousels an address needs to be selected in the configuration dialog box.



The address of a dynamic feeder is set by the factory to 1, which should not be changed unless two or more dynamic feeders are in use at the same time.

1. Please specify the type of feeder (Mass Storage or Paternoster Magazine operate in the same way).
2. State the number of compartments for a Carousel. The standard value for Magazines must not be changed.
3. By pressing **Konfigurieren** the coordinates of the pick up areas can be set. For Carousels one container and for Magazines one row of containers must be configured.
4. The definition of the corner points is similar to that for stationary feeders. For Carousels, however, all *four corners* need to be specified (see figure) and it is absolutely necessary to keep the given order of the corner points.



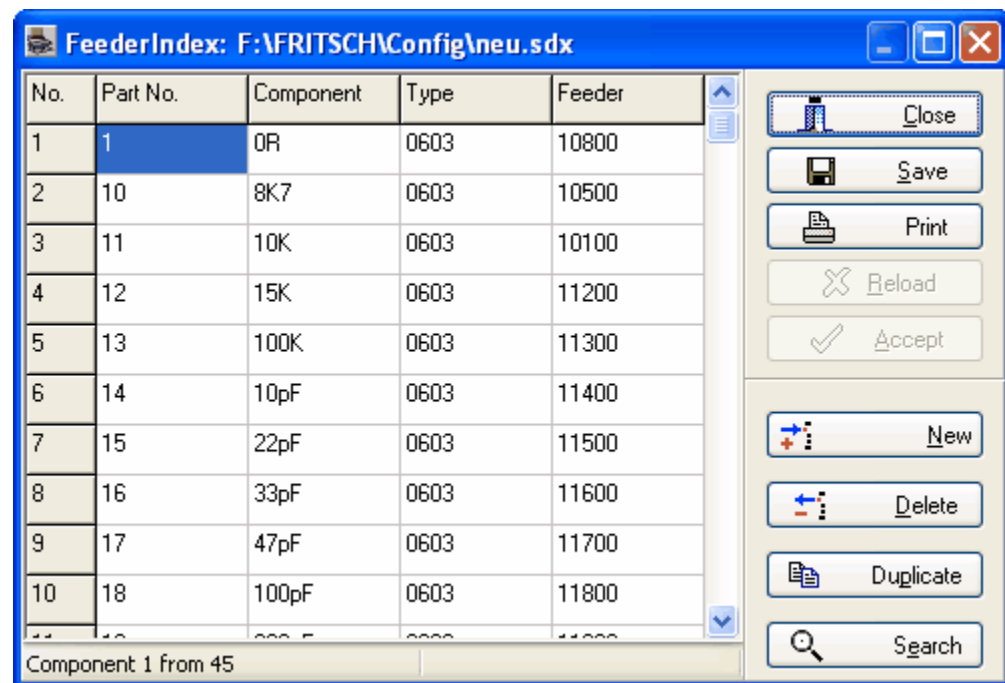
By pressing  the dialogue box can be exited, when the configuration can also be saved under an appropriate name.

3.3 How do I create a feeder index?

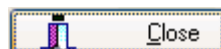
The Feeder Index Modul is an option that is only available with the appropriate licence.

A Feeder Index can be made and edited easily and simply from the Feeder Index window. As soon as a new component number or feeder is entered in a Pick and Place file, the other details are automatically completed from the Feeder Index file. This is particularly helpful when converting CAD files, since it is no longer necessary to manually allocate a feeder to each position. Component numbers and part information, not contained in the current Feeder Index, can be transferred with a mouse click.

Der Feeder Index Dialog

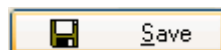


The file name of the open Feeder Index is shown at the top of the dialogue window. Within the table, the existing parts information can be altered as needed, however, entries under the headings of Component Number and Feeder are checked for duplications and non existent feeder numbers. As soon as the current Feeder Index is changed a corresponding marker appears in the status indication.



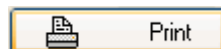
Button Close

Closes the dialog giving the option to close without saving any unsaved alterations.



Button Save

Saves the current state.



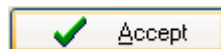
Button Print

Prints the current feeder index.



Button Reload

Discards all changes and reloads the file.



Button Accept

Accepts a new entry. It is not the same as saving the current feeder index.

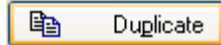


Button New

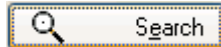
Creates a new line at the bottom of the table. With accept the entry is stored in the feeder index.

**Button Delete**

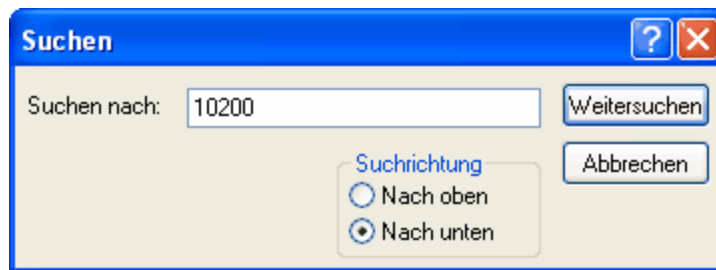
Removes the selected entry from the table.

**Button Duplicate**

Duplicates the selected row. It will be attached at the end of the table with the values of the selected row without part number and Feeder number.

**Button Search**

Opens a search dialog which allows to search for any text within the table.

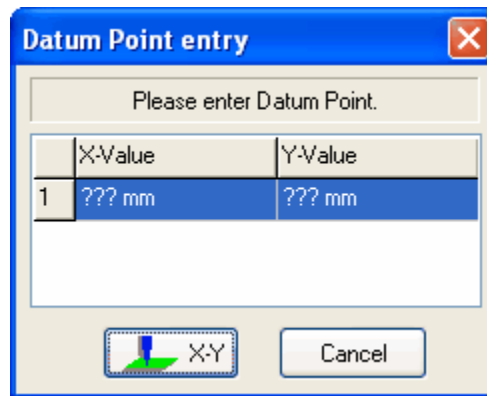


By pressing Mit jedem Klick auf die Schaltfläche Weitersuchen wird der nächste Eintrag gesucht und in der Tabelle die entsprechende Zelle markiert.

3.4 How do I program a new board?

Before programming a new board you should check the options settings. This can be done by opening the Options dialog box and confirming the settings (Siehe Options).

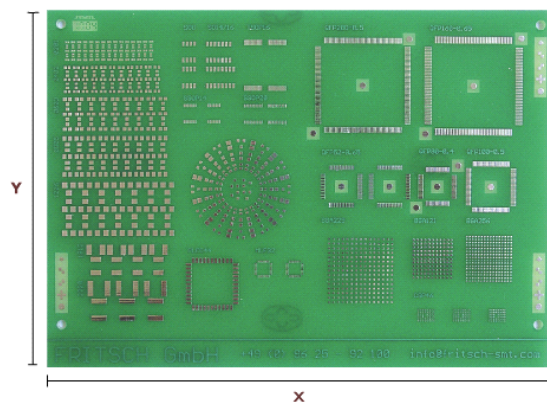
1. If you have not done it before, please load the feeder configuration corresponding to your PCB.
2. Select the command „**New**“ in the „**File**“ menu.
3. The following dialogue asks for the entry of datum points. Depending on the Options Settings one or three datum point(s) will be needed.

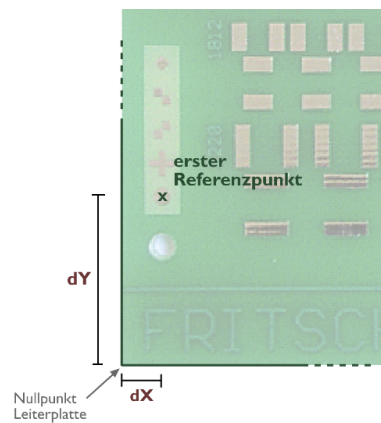


Three datum points automatically compensate for angular misalignments of PCBs, especially important for round boards or highest accuracy with very large PCBs.

4. After entering the datum points a new dialog will prompt you to enter the project properties.
You can specify an author, a name for the PCB, a name for the project and the company name. You can attach a certain feeder configuration file that will always be automatically loaded when you load the project.

For the virtual view it is **vital** that you enter the PCB size and the offset of the first reference point to the PCB zero point.





Properties

Created: 25.10.2006

Modified:

Author: SC

PCB: Fritsch Demoboard

Project:

Company: Fritsch GmbH

Feeder Coord. ☐ Load

Feeder Index ☐ Load

PCB

| | X | | Y | |
|---------------|---|---|---|--|
| Size | <input type="text" value="170,000"/> mm | x | <input type="text" value="120,000"/> mm | <input style="float: right;" type="button" value="?"/> |
| Offset Ref1 * | <input type="text" value="5,000"/> mm | x | <input type="text" value="21,000"/> mm | <input style="float: right;" type="button" value="?"/> |

Background image:

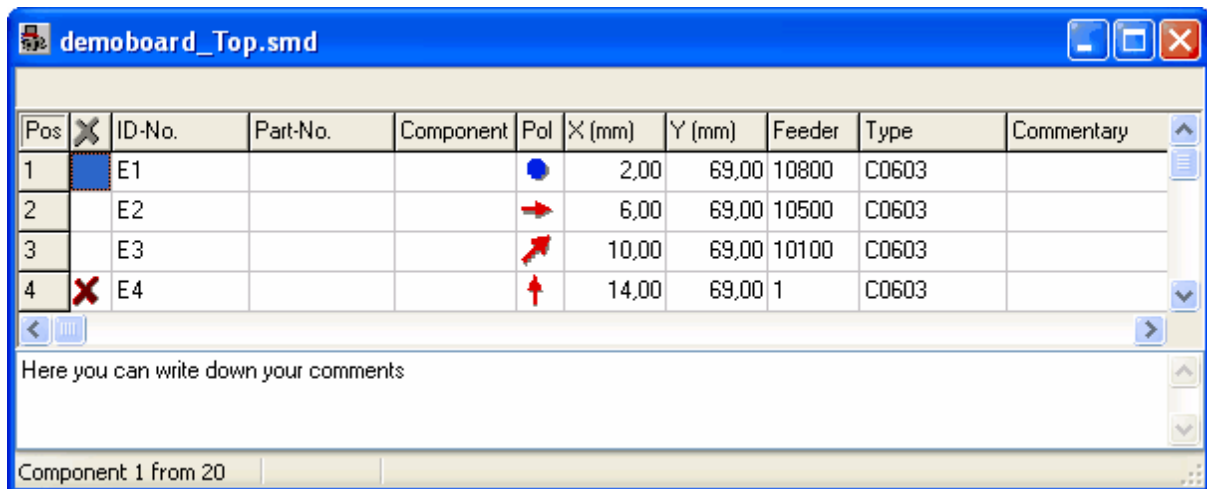
* The offset is measured from the PCB zero point to the 1. reference point with positive sign.

Furthermore it is possible to include a background image which you have scanned with a scanner.



We do not recommend to use a background image while you are producing. There can be some differences between the pads and the virtual components because of production tolerances of the PCBs.

5. Individual components can now be programmed in the File window.



The Datasets are containing the following information for all positions on the PCB:

Position

This is an incremental number with no other meaning than to identify a pick and place step.



Individual placements can be deactivated by use of this field for such applications as populating different variants from the same basic program. Double clicking, the space bar or the right mouse button can all be used to activate or deactivate this field.

ID-Number

For the recording of assembly specific component names, such as circuit references (e.g. R1).

Part Number

For the recording of assembly specific component names, such as circuit references (e.g. R1).

Component Discription

Additional information about the components, such value (e.g. 100R / 0.5W).

Polarity

The orientation of a component in relation to the PCB can be selected from a scrolling list by clicking this field. Using the Space Bar has the same effect.

With „Num-Lock“ on the direction arrows of the number pad allow direct input. „+“ and „-“, represent vertical and horizontal.

X / Y – Position

Placement position on PCB. This can be taken direct from the layout drawing or, more usually, established by pressing **F7**. After coupling the placement head with the locator arm and placing, or pretending to place, the component, the current position is automatically recorded in the placement file, by pressing **F7**, while the head is still lowered.

If the **Teach-In Supervision** is activated, the program verifies, whether the position is still available. If this is not the case, you will be offered to enter another position. If you copy and insert one or more rows of the SMD file, the duplicated positions will be highlighted and in the status bar above is shown the message, that at least one X-Y-Position is defined double.

| Pos | ID-No. | Part-No. | Component | Pol | X (mm) | Y (mm) | Feeder | Type | Commentary |
|-----|--------|----------|-----------|-----|--------|--------|--------|-------|------------|
| 1 | E1 | | | • | 2,00 | 69,00 | 10800 | C0603 | |
| 2 | E2 | | | → | 6,00 | 69,00 | 10500 | C0603 | |
| 3 | E3 | | | ↗ | 10,00 | 69,00 | 10100 | C0603 | |
| 4 | E4 | | | ↑ | 14,00 | 69,00 | 1 | C0603 | |
| 5 | E5 | | | ↖ | 18,00 | 69,00 | 2 | C0603 | |
| 6 | F6 | | | ← | 22,00 | 69,00 | 3 | C0603 | |

Here you can write down your comments

Component 1 from 20

Attention !! At least one x-y-position is defined double

Feeder

Feeder Number. This information specifies the pick up area. Stationary feeders simply have incremental whole numbers. Dynamic feeders are specified by their device address and row and/or component bin number. Further details about the structure of feeder numbering can be found in **Appendix A – Feeder**.

Component Type

Component case size / type. This information is used for the allocation of placement tolerances (normally: small components = small tolerances; large components = large tolerances) or for identifying the pad arrangements for AutoDispensing.

Comment

Any information can be added here.

Individual fields are reached by using the Arrow Keys. The Tab Key shifts to the next field to the right; Shift-Tab to the left.

These field can contain any character apart from Comma, which is used in placement files as delimiter between values.



By clicking on the column header the placement records can be sorted according to their values. E.g. ID-Numbers or Component Descriptions.

When all necessary information is entered for a placement record the program automatically creates another line blank for the next record.

Please save the program with the command **Save As** in the **File** menu.

3.5 How do I change a program?

An existing placement program can be changed from within two programming modes.

Simple changes, such as adjustments of Component Descriptions can be carried out directly in the file window. However, recording placement positions, using the **F7-Key**, needs to be done after using the command **Edit Components** in the „**SM902**“ menu. There will be a Dialogue Box requesting the confirmation of datum point(s), as only this way the machine will „know“ the current position of the PCB.

1. Load the file to be changed („**File**“ menu, „**Open**“ command).
2. Start the „Edit Mode“ if positions are entered via **F7**.
3. All values can now be altered (please see How do I program a new board?). In addition, copy and move functions are available. These functions conform, in the main, to the Windows standard.
4. Any changes should be saved with either „**Save**“ oder „**Save As**“.

3.6 How do I convert a CAD file

This function is only active when the **CAD Conversion CG948 module** is part of your software package.

With the CAD Conversion you can open a PP-File from your CAD-System and convert it into a SMD-File for the FRITSCH Semi Auto Pick and Place SM902. If the Feeder Index module is also part of your software package, the Feeder numbers will be assigned to the part numbers automatically. The files to convert must be ASCII text files.

1. Load a suitable setup file for the CAD file in the CAD setup dialog. (Menu "**Control**", command **CAD-Setup...**). Please see chapter **Program Description - Menu Control - CAD-Setup...** for further information how to create a CAD setup file.
2. Open the CAD file you want to convert (Menu „**File**“, command **Convert**).
3. A PP-file for the SM902 will be created now from the selected CAD file. This instance may last up to several minutes depending on the size of the file. If your CAD file contains PP informations for the top and the bottom side of the PCB, two PP files will be created (one for each side).

4. After the conversion you have to assign feeders to each PP position. Conversion is complete, when all PP position contain a valid feeder number. In the menu "**Conversion**" you find the commands **Manual Allocation** and **Automatic Allocation**, that will simplify the assignment of the feeder numbers. You find the description of this dialogs in the chapter **Program Description - Menu Conversion**. If you use the software module **Feeder Index**, all serial numbers, contained in the feeder index file, will be allocated to the correct feeder number during the conversion. Not allocated positions can be complemented after the conversion with the manual allocation.
5. All values can now be altered (please see „How to program a new board ?“). In addition, copy and move functions are available. These functions conform, in the main, to the Windows standard.
6. Save the complete converted CAD file using the command "**Save**" in the "**File**" menu or the save button in the tool bar. This command is only activated, when the CAD file is converted completely. The name of the CAD file extended with the PCB side is used as the default filename.

3.7 How do I populate a board

1. Load the file to be used for picking and placing („**File**“ menu, „**Open**“ command).
2. Start picking and placing with command „**Start Placement**“ from „**SM902**“ menu.
3. The following datum point dialogue box asks for entering the datum point(s), as per the program.
4. The program will then direct you through all the Pick & Place steps as recorded.

3.7.1 Pick a component from a feeder

It is not necessary during the pick & place process to look at the monitor. All required information is available directly from the pick & place machine. Additionally the current feeder is displayed at the monitor, if you have switched on the virtual view.

For the pick up of a component from a feeder the corresponding LED flashes. All required information is available directly from the pick & place machine.

The direction is also shown by the compass needle at the monitor. The vacuum for the pick up of the component is only switched on if you are over the correct feeder.

3.7.2 Place the component

As soon as the component is picked, the polarity LEDs at front of the placement head indicates the orientation for the placement. Additionally it will shown on the monitor. The locator arm moves to the placement position, where the locator pin

from the placement head should be inserted in the locator arm eye. The direction where the head should be moved is also shown on the monitor by a compass needle if you have turned on the virtual view.

The virtual view of the PCB is optimized for the current screen resolution.

Therefore a blind area can exist while moving the head. If the head is in one of these areas, blue lines will indicate where the head will be show up again, either on the PCB or on the outer machine area.

Any placement steps can be skipped or repeated by using the **F7** key, after which the step to be continued from can be specified.

3.7.3 Toolchanger

The Tool Changer provides for simple Pick Up Nozzle changes. If the position for the Tool Changer has been defined in „Options“ its position will be automatically recognized, otherwise the **F9** key can be used for this purpose.

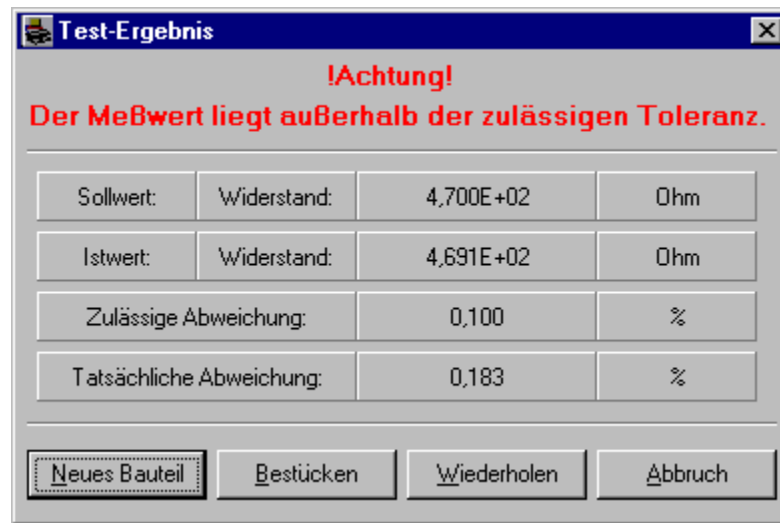
3.7.4 Component Flipping Device

The Component Flipping Device is also automatically recognized, as soon as its position is defined in „Options“. Otherwise the use of the Component Flipping Device is not properly possible.

3.7.5 Component tester

If the column 'Test' is selected at the actual component, you will be asked to place the component in the teststation after picking it from the feeder. By using the FRITSCH-teststation, it is possible to start the testprocedure automatically after inserting the component (Automatic Test): The component will be contacted and the test will be started. If the measurement result is inside the given tolerance, you will be requested to place the component on the PCB. Otherwise, the measurement result, the rated value and the divergence are shown in a Message box. There you can choose between following points:

- take a new component (New Component) -> schlechtes Bauteil in Abwurfbereich legen
- place the component nevertheless (Place) : This is only available, when the corresponding option is checked.
- repeat the measurement (Retry)
- abort the Pick&Place Program (Abort)



The measurement results can be documented over the connected printer. The test protocol will be generated for each PCB separately, provided, that one protocol option is selected.

Selecting the tester, the teststation, the test automatic, the kind of test protokoll and the permission for placing outranged components can be done in the option dialog on the page 'Tester'.

3.7.6 FinePitch components

If your Semi Auto Pick & Place Machine is prepared for Placing FinePitch Components (second Placement Head with FinePitch Adapter), you have to mark the relevant Components with an asterisk in the FP-Column of the Tolerance File, so that the placement file can recognise the Component correctly. During the Pick & Place Prozeß you will be asked to Place the picked Component in the Pre-Location Fixture and then place it with the FinePitch Adapter on the PCB (the Vacuum of the Standard Placement Head is locked meanwhile). Because the second Placement Head has no Position Measurement and no Head Sensors, the user has to confirm the correct Placement of the Component manually in the shown Dialog. Only then, the Program goes to the next Step.

When a placement program is interrupted, this point of interruption is recorded so that when returning to the program the next time resuming from that point is available as an option.

3.8 How do I apply adhesive dots?

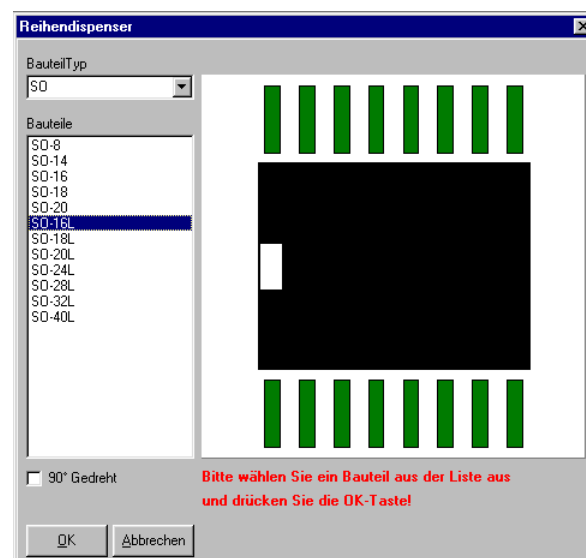
When the Semi Auto Machine is equipped with a Dispenser, the software module „Adhesive Dispensing“ will be available. This module permits the dispensing of adhesive dots, intended for attaching components.

1. Load the file to be used.
2. Start the adhesive application with the command **Dispensing > Adhesive Dispensing** from the „SM902“ menu.
3. After entering the datum point(s) dispensing can begin.
4. The program positions the Locator Arm to the first placement position. Enter the Locator Pin into the Eye of the Locator Arm and dispense the adhesive dot. Between individual dispensing actions the Placement Head needs to be allowed to return to its uppermost position in order for the next dispensing step to be initiated. These steps are repeated until all adhesive dots are dispensed.

This mode also provides for skipping adhesive dispensing steps by the use of the **F7-Key**.

3.9 How do I apply solder paste?

This Dialogue Box provides for the application of solder paste on to PCBs. Individual component types can be selected.



1. At first, establish which „Component Type“ to be used; for a full listing select the empty line. When the desired component is selected from the list a graphic representation appears.
2. Use of the Checkbox „90° Rotation“ will rotate the representation by 90° to match it to the actual arrangement on the board. This function is not active when a rotation of a component would have no effect (square shape).
3. The „OK-Button“ starts processing.

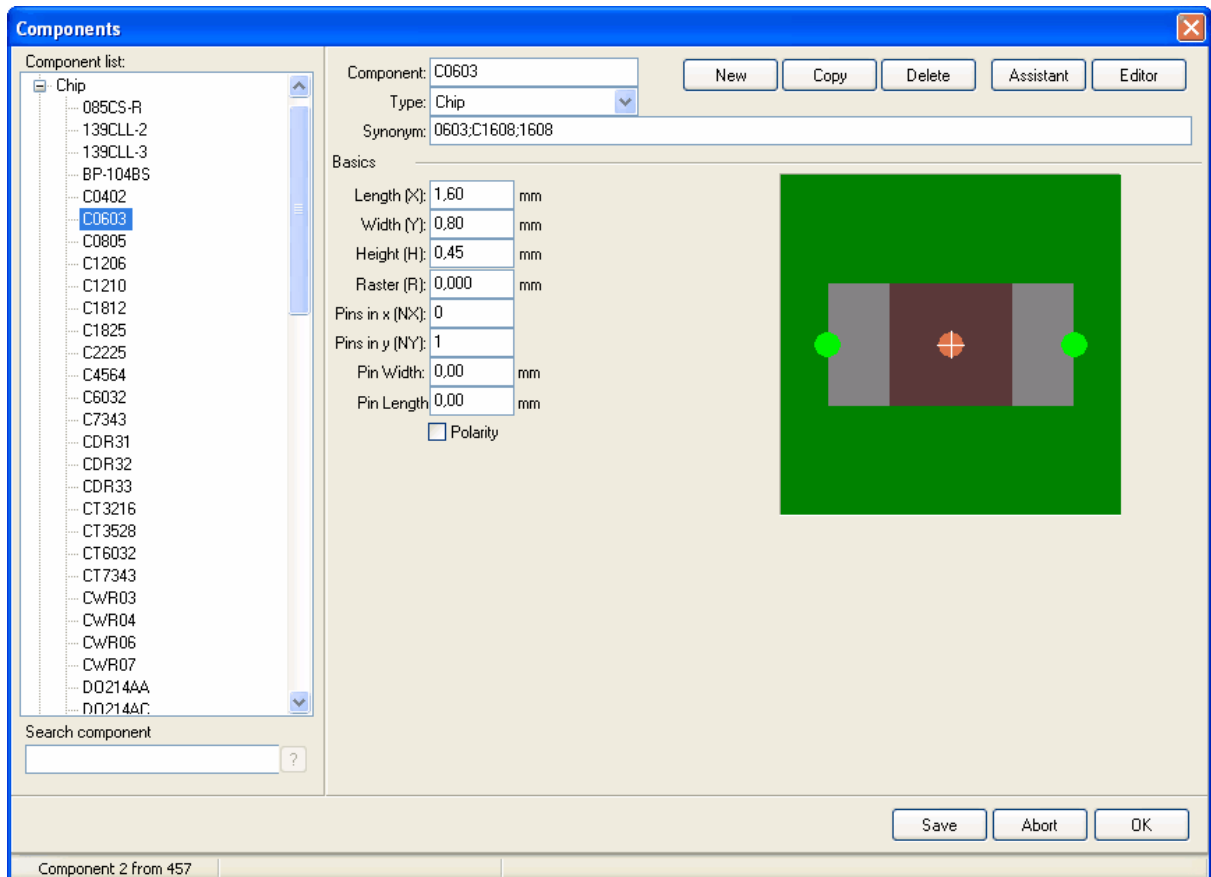
4. All datum points, indicated in red and requested by the program have to entered by pressing the button „X_Y“ or „F7“, while the Locator Pin and Eye are engaged and the Pick Up Nozzle is placed on the appropriate pad.
5. After entering the datum points, confirming with the „OK button“ and lifting the Placement Head, the Locator Arm moves in turn to each dispense position. The current position is highlighted in light blue and already covered positions turn white.
6. At the end of each component specific dispensing set the Dialogue Box returns to the starting state, from which another component can be selected or dispensing terminated by use of the „Terminate“ button.

!!! The „Terminate“ button will finish each specific task.

3.10 How do I use the libraries?

3.10.1 Component editor: Component library

In the component library the data for the virtual view of every component is stored. The most common components are already contained.



Edit an existing component:

1. Select a component for the Component-List. In order to easily locate a specific component put in the first letters into the box next to the question mark and start the search by pressing the "?".
2. Now you can change the component data so they fit to your demands.
3. To assign the changes press the button "Save".
4. After all changes press the „OK“ button to close the editor and save the component library with all changes made.

Create a new component:

1. First press the button "New" and assign a name to the component in the input box "Component". You can also specify synonyms for the component.
2. Choose the type of the component.
3. Then assign the basic data for the component: length, width, height, raster, pins, etc.
4. After assigning the basic data you must draw the shape of the component. You can do this by using the Assistant or draw it with the Editor.
5. After specifying all data close the component editor by pressing the OK button.

Copy a component:

1. First press the Copy button and change the name of the new component.
2. Assign all the data as specified for creating a new component.

Overview Input Fields:

Component-List:

| | |
|-------------------|---|
| Component-List: | Listbox with all components contained in the library |
| Search component: | Input the search item and start the search by pressing the "?" button |

Parameter:

| | |
|--------------------------|--------------------------------------|
| Component: | Component name |
| Type: | Choose the type of the component |
| Synonym: | Specify other names of the component |
| Length: | Length of the component |
| Width: | Width of the component |
| Height: | Height of the component |
| Raster: | Raster of the component |
| Pins in x, Pins in y: | Number of pins in X- und Y-direction |
| Pin Width: | Width of the pins |

| | |
|-----------------|--|
| Pin Length: | Length of the pins |
| Polarity: | Has the component a polarity |
| Buttons: | |
| New: | Creates a new component, resets the input fields |
| Copy: | Copies the selected component |
| Delete: | Deletes the selected component from the library |
| Assistant: | Opens the Assistant to draw a component |
| Editor: | Opens the Editor to draw a component |
| Save: | Saves the last changes |
| Abort: | Closes the library without any changes |
| OK: | Closes the library and saves all changes |

3.10.2 Component editor: ADNorm

The component editor „ADNorm“ facilitates the editing of existing components in the Standard Library and to add to the list

Editor ADNorm.dat

Component-List:

- BLUE-E
- BLUE-H
- BLUE-I
- BLUE-L
- BLUE-P
- BLUE-U
- BRUE-A
- BRUE-B
- CERECX
- CERLED
- CERXF
- CG-20**
- CG-22A
- CRIS-1

Search for Component:

Parameters:

Component: CG-20

Type: RECT

Dispense Volume: 0,10 qmm

Lead Pitch (R): 1,27 mm

Pad-Distance in x (Mx): 11,112 mm

Pad-Distance in y (My): 6,667 mm

No. of Pins in x (Nx): 6

No. of Pins in y (Ny): 4

Total No. of Pins: 20

Shift of dispensed Points: 0,3 mm

☐ Datum Point

Dimensions:

Body: in x: 12,065 mm

in y: 7,62 mm

Pad: in x: 0,76 mm

in y: 1,52 mm

New Delete Back Accept Cancel OK

Component 38 from 209

Dealing with an existing component:

1. Selection of a component from the „Component List“. To speed up the selection the first character of the component name can be entered in the box next to the question mark. The search is started with the „?“ button.
2. The component details can now be altered and made to match your requirements.
3. To accept the changes, please press the „accept“ button.
4. When all changes have been made, the „OK“ button saves these changes to the Standard Library and exits from the editor.

Entering a new component:

1. To start the process the button „New Component“ is operated and a new component name entered in the field „Name“.
2. A TYPE needs to be chosen; if not certain, similar components can be checked from the list or in the appendix under „Component Types“.
3. Next, the dispense volume is specified.
4. if the datum point is to be manually entered before this component information can be used, please mark „Component Datum Point“.
5. Entry of Pin Number, Lead Pitch Spacing, Pad Row Pitch, etc, according to component type.
6. Finally, the button „Accept“ will save the component in the list
7. When all changes and alterations have been completed, the „OK“ button saves them in the Standard Library and exits the editor.

Overview Input Fields:

Component List:

Component List: this list contains all specified components
 Search for Component: Enter Searchtext for Component Type, start the Search Function by pressing the ? Key

Parameters:

| | |
|-------------------------|---|
| Component: | Component Name. |
| Type: | Component Type. (SO, SQUARE etc.) |
| Dispense Volume: | Dispensing Volume for the pads of the current component |
| Lead Pitch (R): | lead pitch of component |
| Pad Distance in x (Mx): | centre distance between pad rows in x-Direction |
| Pad Distance in y (My): | centre distance between pad rows in y-Direction |
| No. of Pins in x (Nx) | |
| No. of Pins in y (Ny) | |
| Total No. of Pins | |
| Datum Point: | for manual input of datum point before Dispensing this |

Shift of dispensed Points: Component.
Shift of dispensed Points laying side by side, to prevent
Solder Bridges

Dimensions (see graphic):

| | |
|------------|----------------------|
| Body in x: | Case Dimensions in x |
| Body in y: | Case Dimensions in y |
| Pad in x: | Pad Dimensions in x |
| Pad in y: | Pad Dimensions in y |

Buttons:

| | |
|---------|--|
| New: | clears the input fields ready for new inputs |
| Delete: | deletes component from list |
| Back: | reverses the most recent action |
| Accept: | accepts the new component and any changes made to existing ones |
| Cancel: | exits the Editor without saving any changes |
| OK: | exits the Editor and saves changes |

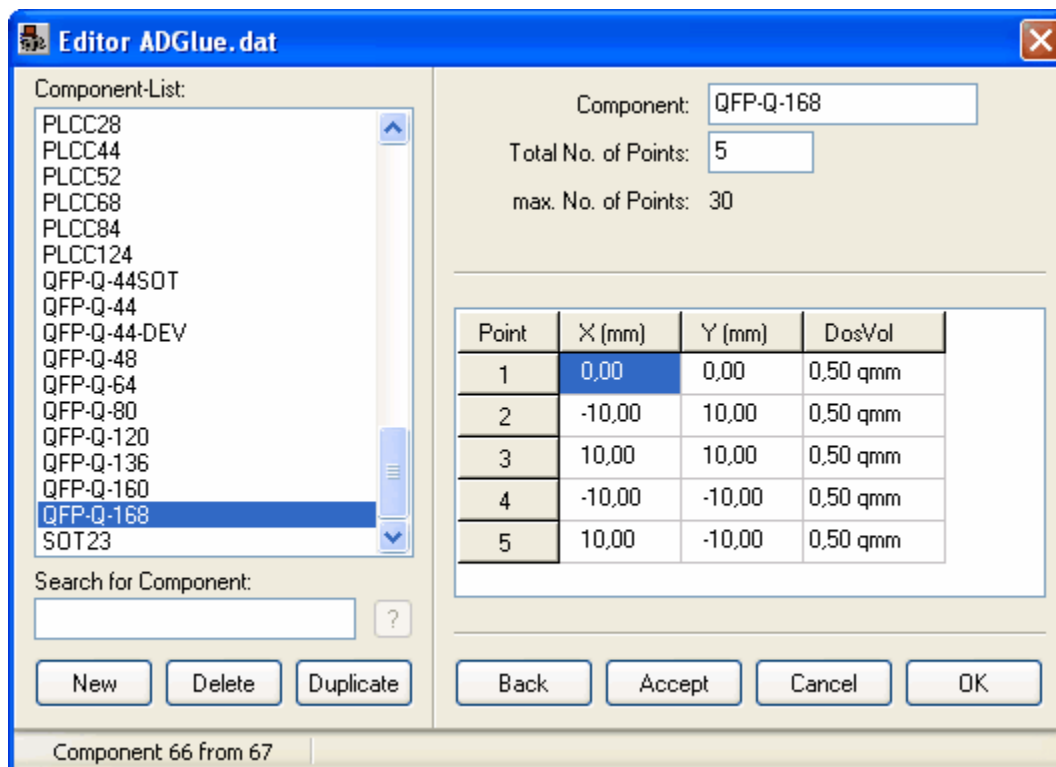
Graphic representation of component type: lower left, below the Search Function.

3.10.3 Component editor: User & Glue

Since the User and Adhesive Libraries do not differ greatly, no specific description is provided here. Individual differences: the User Library refers to Dispense Volume (DosVol), whereas the Adhesive Library has Adhesive Volume (GlueVol). Manual entry of a datum point is not possible in the Adhesive Library.

The Component Editor User & Glue allows the processing of components from the User and Adhesive Library and to add new components.

The User and Adhesive Library requires that all points be entered individually and related to a common datum point.



Dealing with an existing component:

1. Selection of a component from the „Component List“. To speed up the selection the first character of the component name can be entered in the box next to the question mark. The search is started with the „?“ button.
2. The component details can now be altered and made to match your requirements. Points not visible can be reached by using the scroll bar to the right (downward) or with the arrow keys. When entering the Dispense Volume, the value for the first point will automatically be applied to subsequent lines. Each line will also accept individually specified values.
3. To accept the changes, please press the „accept“ button.
4. When all changes have been made, the „OK“ button saves these changes to the User or Adhesive Library and exits from the editor.

Entering a new component:

1. To start the process the button „New Component“ is operated and a new component name entered in the field „Name“.
2. Next, the number of component connections is required. This number also determines the points in the graphic representation.
3. If the datum point for a component is to be confirmed manually before processing, please mark „Component Datum Point“. (This point is only present

in User Library.)

4. Co-ordinates for individual point now need to be entered. Points not visible can be reached by using the scroll bar to the right (downward) or with the arrow keys. When entering the Dispense Volume, the value for the first point will automatically be applied to subsequent lines. Each line will also accept individually specified values.
5. Finally, the button „Accept“ will save the component in the list
6. When all changes and alterations have been completed, the „OK“ button saves them in the User or Adhesive Library and exits the editor.

Copying an existing component:

This function allows an existing component to be copied to make entering a similar component easier. The only thing to be changed is the component name; to make this obvious this field remains blank. Processing is similar to „Dealing with an existing component“.

Overview Input Fields:

Component List:

| | |
|-----------------------|--|
| Component List: | this list contains all specified components |
| Search for Component: | Enter Searchtext for Component Type, start the Search Function by pressing the ? Key |

Input Fields:

| | |
|--------------------|--|
| Component: | Component Name. Field for input and display of name. |
| Total No. of Pins: | number of Contacts of Component |
| max. No. of Pins: | maximal permitted Number of Contacts |
| Datum Point: | for manual input of datum point before Dispensing |
| Pitch: | Column 1: number of point Column 2: X Coordinate Column 3: Y Coordinate Column 4: Dispensing Volume |

Buttons:

| | |
|---------|---|
| New: | clears the input fields ready for new inputs |
| Delete: | deletes component from list |
| Copy: | makes a copy from the selected component (only the Component Name needs to be entered) |
| Back: | reverses the most recent action |
| Cancel: | exits the Editor without saving any changes |
| OK: | exits the Editor and saves changes |

Chapter



IV

4 Program Description

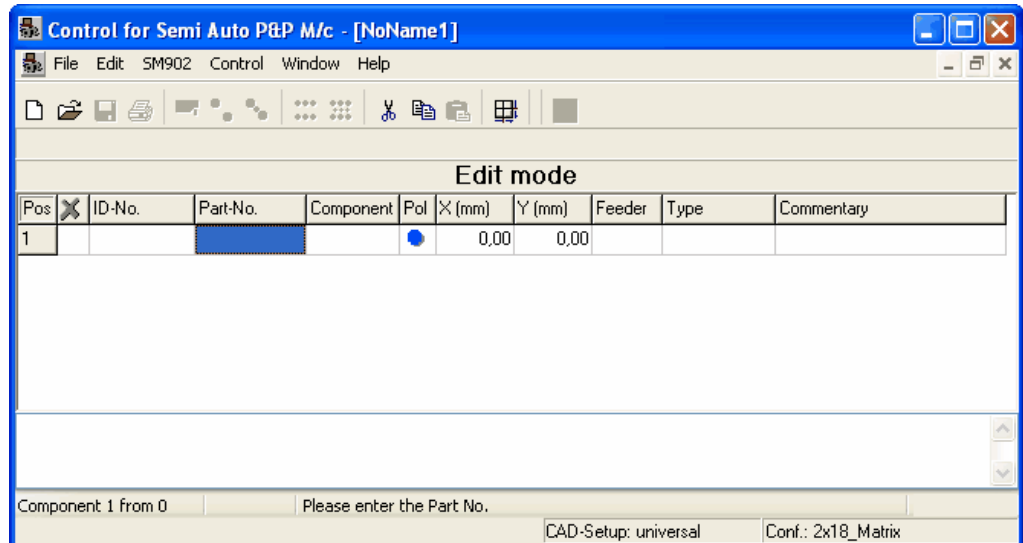
This chapter describes all the menu entries in detail.

The menu entries will be described in the order in which they show up in the program. The chapter is similar designed like the menu structure.

4.1 Menu File

4.1.1 New

The command “New” produces a new placement file. After entering the datum point(s) for the PCB the positions and their details can be entered. The meaning of the single columns and the programming is described in Chapter 3.



4.1.2 Open

Opens an existing placement program. To chose a file the default Windows open dialogue is used.

4.1.3 Convert

This menu point is only activated, when the CAD Conversion CG948 module is part of your software package. With the CAD Conversion you can open a placement file from your CAD-System and convert it into a SMD-File for the FRITSCH Semi Auto Pick and Place SM902. If the Feeder Index module is also part of your software package, the feeder numbers will be assigned to the part numbers automatically. The default Windows file opening dialogue box is available.

4.1.4 Close

Closes the current placement program without closing the application. If the program has been altered it can now be saved or the changes abandoned.

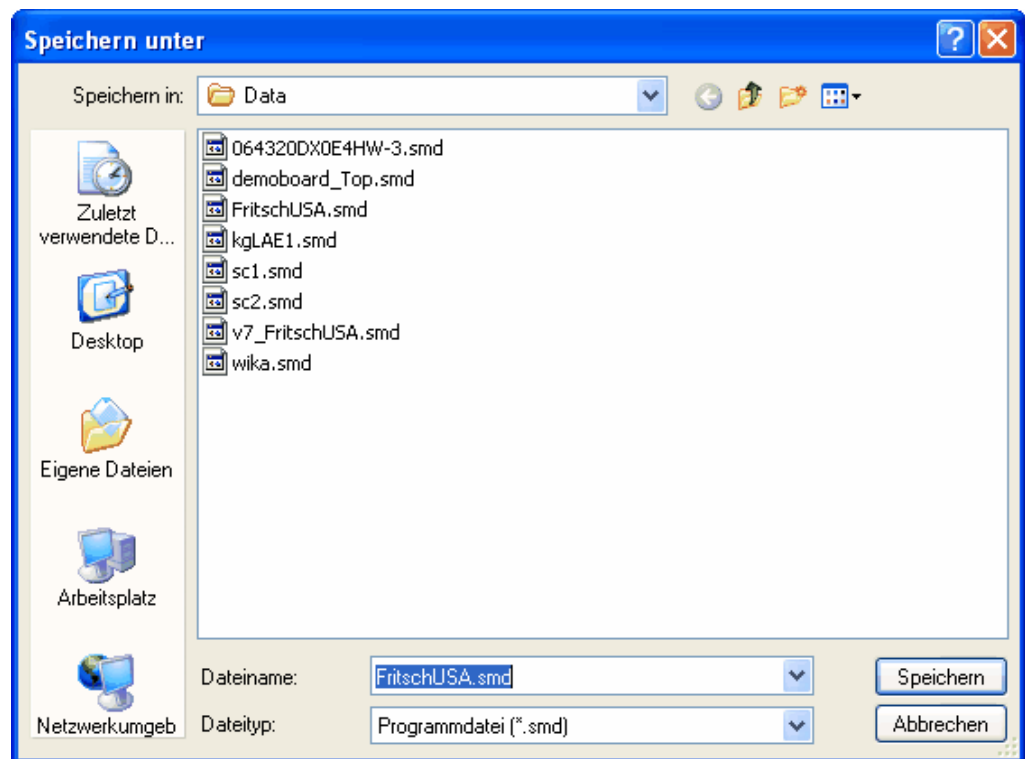
4.1.5 Save

Saves the placement file with the current name. If no name is yet assigned, the **Save As** dialogue opens automatically.

4.1.6 Save As

Saves the placement file under a different name. The default Windows file save dialogue is available.

You can create subdirectories to save the files. There is no limitation for the number of subdirectories.



4.1.7 Properties

Shows the properties dialogue box for the current placement file. Additional information can be recorded here, such as date of the most recent change or the name of the project this PCB belongs to. Further information about loading an background image can be found in Appendix C.

The image shows a 'Properties' dialog box with the following fields and sections:

- Metadata:**
 - Created: 25.10.2006
 - Modified: (empty)
 - Author: SC
 - PCB: Fritsch Demoboard
 - Project: (empty)
 - Company: Fritsch GmbH
- Feeder Configuration:**
 - Feeder Coord.: (empty text box)
 - ☐ Load
 - Search... (button)
 - Feeder Index: (empty text box)
 - ☐ Load
 - Search... (button)
- PCB Dimensions:**
 - Size: X=170,000 mm, Y=120,000 mm (with help icons)
 - Offset Ref1 *: X=5,000 mm, Y=21,000 mm (with help icons)
 - Background image: D:\Sm902\PCBs\fritsch_sc_02.jpg (with file explorer icon)
- Footnote:**

* The offset is measured from the PCB zero point to the 1. reference point with positive sign.
- Buttons:** OK, Abort

Automatic load of Feeder Coordinates

The entry field „Feeder Configuration“ is used to specify the configuration intended for this board. When „Load“, is activated an automatic check is made to establish whether the correct configuration is loaded, if not, this is corrected automatically, after flashing up a message that the feeders require changing.

Automatic load of Feeder Index

The entry field „Feeder Index“ is used to specify the Feeder Index intended for this board. When „Load“ is activated, the Feeder Index will be loaded and checked automatically after opening an SMD-File. However, this Area is only visible, when the CAD Conversion CG948 module forms part of your software package.

4.1.8 Printer

There is a choice of two variants for printing. The pick and place list shows all the positions and the component values. The material list groups together and counts up identical components. This makes it easier to kit up the Semi Auto Machine. With 'Test Protocol' you can print the last state of the protocol file.

4.1.9 Printer Setup

The Windows Printer Options for a particular printer can be set here. Further details can be obtained from your Windows or printer handbook.

4.1.10 End

Closes the software.

4.2 Menu Edit

The „Edit“-Menu only contains all commands after an SMD file has been loaded.

4.2.1 Cut, Copy, Paste

These commands largely conform to the Windows standard and can be used to move or copy placement records within or between files.

When inserting in to a file the new position is checked for a possible duplication of ID Number. Should such a duplication be detected the new one is removed prior to insertion.

4.2.2 Find, Find Next

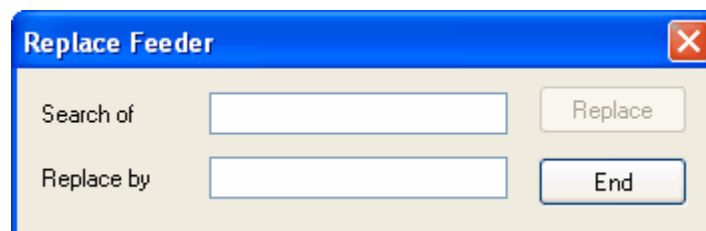
With this command the current file can be searched for a particular value. „Find Next“ finds a second and subsequent occurrence of the value.



By clicking the column headings the placement records can be sorted. They can be sorted e.g. by ID number, component type, feeders, etc.

4.2.3 Replace values

This command makes it easier to change files when, for example, a component becomes available in a new feeder. By entering the old and new feeder numbers and clicking „**Replace**“ all references to the old feeder are replaced with the new one. The command „Replace Part Number“ works in a similar manner.



4.2.4 Move Components

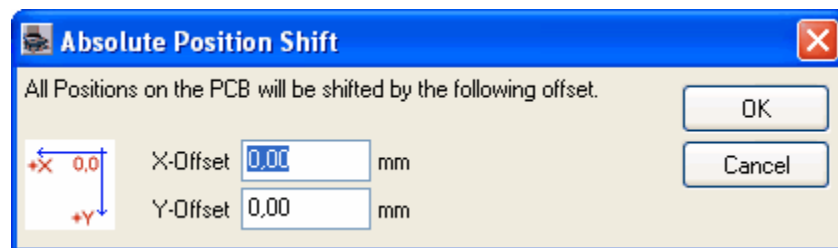
This command enables you, to shift all positions on the PCB by an offset. You may choose between two procedures:



In every placement file it is possible to assign a comment, which has no length restrictions. Make use of this option to add some information to the datum points or any other hints that may be useful. After loading the placement file the comment will be shown below the grid with the placement positions. You can enter your comments directly in this box.

Absolute Value

In this Dialog you can enter an offset by using the keyboard. Dependent on the algebraic sign, the positions are shifted right or left (X-axis) respective up or down (Y-axis). Please heed the system of co-ordinates on the lower left of the dialog, to enter the algebraic sign correctly.

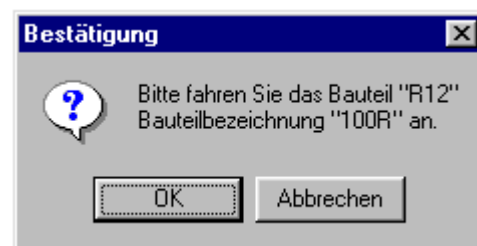


Close this dialog with 'OK' to enter the offset. All positions will now be shifted by this offset. To fix this alteration finally, you have to save the file.

By Component

By choosing the menu option 'By Component' you can teach in the offset by using the pick&place head on the basis of one place position

Mark the desired place position for this process in the grid, before selecting this menu option. First you are requested to enter the fiducial point(s). After that, the locator arm moves to the position stated in the smd file. You are now requested to select the real position of this component.



Bring the placement head to the new position. Pay attention, that the placement head is connected to the locator arm while closing this dialog with 'OK' to enter the offset. All positions will now be shifted by this offset. To fix this alteration finally, you have to save the file.

4.2.5 Calibration

This command opens the calibration dialogue box for calibrating the Semi Auto Pick & Place Machine. It is only available when calibration was not carried out during switching the machine on.

4.3 Menu SM902

This menu contains all commands for editing, picking & placing and dispensing.

4.3.1 Edit Components

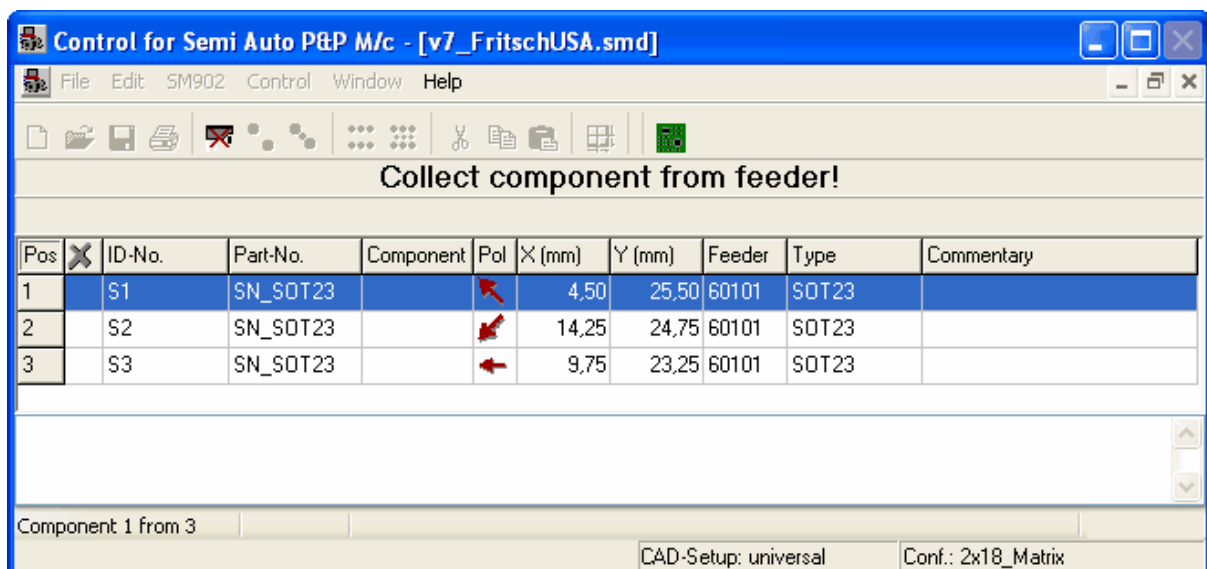
This command starts the Edit mode, which is required for registering precise co-ordinates in the teach method of programming.

At first the datum point(s) of a PCB need to be entered in order to define its location. The **F7 Key** then serves the purpose of registering the placement position. (See How do I change a program).

4.3.2 Start Placement

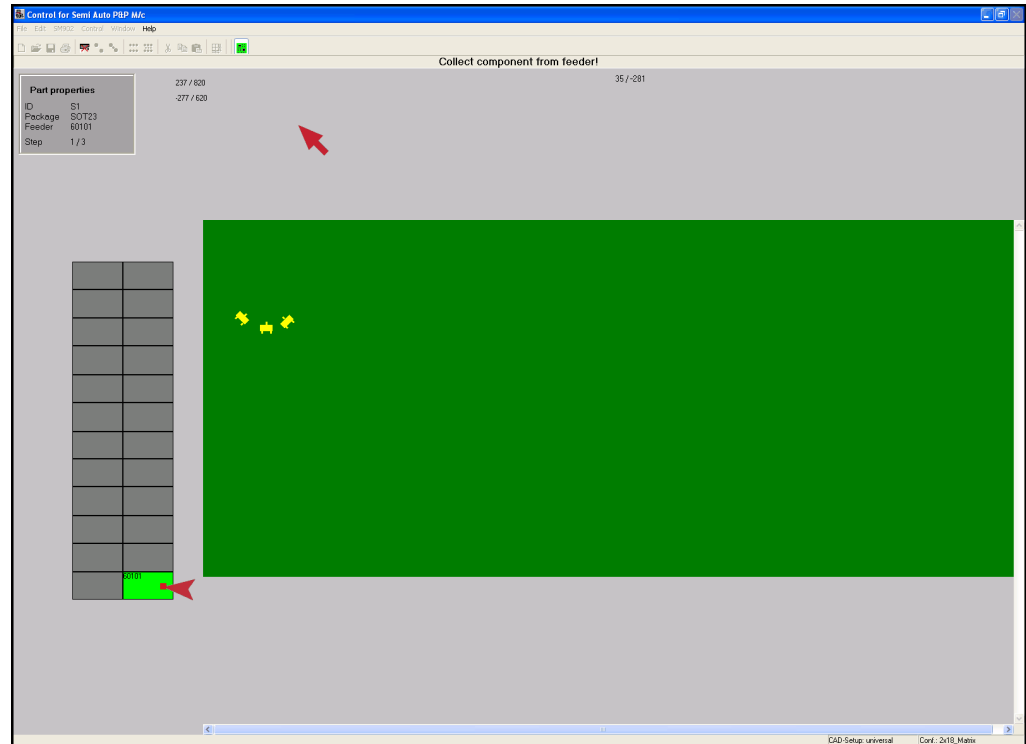
This command starts the pick & place process for the current program file.

1. If you have activated multiboards, you can now chose to mark bad PCBs and deactivate them. Just click on the image of the bad PCB with the left mouse button. Clicking again on the PCB will activate it again.
2. The following dialogue asks you to input the fiducials which are specified for the PCB.
3. The program will lead you to the rest of the pick & place process.



All necessary information will be displayed on the monitor. In the center you can see the PCB. In the outer area the feeders are displayed. In the upper area you can see the image for the polarity of the current component together with the component properties. The area with the component properties can be moved around.

With the SM902 Professional you can also work without the virtual view. All necessary information is then given by the machine itself.



Pick Component

The next feeder is indicated by a flashing LED (optional). On the screen the next feeder is indicated by a different color. The LEDs on the head indicate the polarity of the current component.

If the next feeder is Paternoster or carousel, the correct container is driven automatically to the pick position.

In order to maximize pick security the vacuum is deactivated automatically when you try to pick an component from the wrong feeder. This assures you to always pick the correct component.

Place Component

As soon as the component is picked, the locator arm moves to the next place position. The LEDs on the head indicate the polarity of the component. Connect the head pin with the eye of the locator arm to place the component.

Short above the PCB the breaks of the locator arm are released in order to allow a

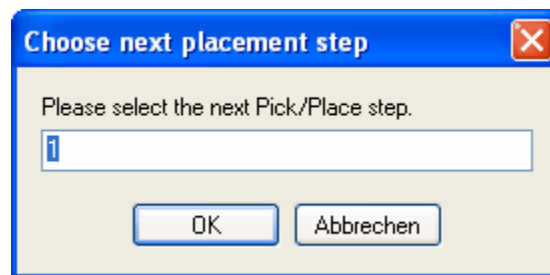
correct placement. In order to avoid a total misplacement you can use the **Placement Supervision** to supervise the deviation from the target position. If you leave the specified area the breaks of the locator arm are activated again which shows you that you have left the specified area. After disconnecting the head pin the locator arm will move back to the target position. More details about tolerances can be found in the menu point Tolerance File Supervision.

The virtual view of the PCB will be adjusted to the current screen resolution. This can lead to dead areas between the outer area and the PCB area. To compensate this blue lines are indicating where the head will show up again either on the PCB or the outer area.

Those two steps are repeated until the PCB is assembled. After finishing a PCB you have the possibility to assemble the next PCB without input of the datum points (see Options: Datum Point Optimization).

Skipping Positions

By pressing the **F7** key you can jump to any position of the placement program. Press the **F7** key before you pick a component.



Then chose the placement step where you want to continue.

Toolchanger

The toolchanger grants an easy change of the tool. If you have specified an area for the toolchanger under Options, it will automatically detected when you want to change the current tool. Otherwise use the **F9** key as long as no component is picked.

Component Flipping Device

The component flipping device is also automatically detected as far as it is activated in the Options. Otherwise the component flipping device cannot be used.

Carousel Change

You will automatically asked for changing the carousel if the needed carousel is not attached to the semi automatic machine. This allows you to use more then one carousel for the pick & place process. More details about changing a carousel can be found in **appendix Feeder**.

Feeder Optimization

The activation of the feeder optimization is done under Options. Before the placement starts the single positions will be sorted by feeders. This eases the pick & place process because you do not have to look always which feeder is the next one. The feeder only changes if there must no more components from this feeder be placed on the PCB.

Datum Point Optimization

The activation of the Datum Point Optimization is done in the Options. It works for the pick & place process and the dispense mode.

This function allows you to skip the input of the datum points for the same PCB.

After finishing a PCB no dialogue will ask you for the datum points again.

We strongly recommend to use the Datum Point Optimization only with a mechanical stopper for the PCB holder to guarantee a constant placement accuracy.

4.3.3 Motor Magazine Positioning

With this command you can move the motor magazines (Paternoster, carousel) to their zero positions.

4.3.4 Dispensing

Glue / Adhesive Application

This command is used for applying glue or solder dots on the PCB. The procedure is similar to the pick & place process.

1. If you have activated multiboards, you have now the possibility to mark bad PCBs. Just click on the image of a bad PCB to deactivate it or click again on it to activate it.
2. The following fiducial dialog asks you to move to the fiducials which are assigned to the PCB.
3. The program will lead you to the rest of the process with the message in the upper section of the window.

| Pos | ID-Nr. | Sach.-Nr. | Bauteil | Pol | X (mm) | Y (mm) | Zubr. | Bauform | Kommentar |
|-----|--------|-----------|---------|-----|--------|--------|-------|---------|-----------|
| 1 | 11 | 123456 | 100R | 1 | 20,00 | 20,00 | 1 | 1206 | |
| 2 | 44 | | | 1 | 35,00 | 30,00 | 1 | PLCCR18 | |
| 3 | 53 | | | 1 | 10,00 | 50,00 | 1 | PLCC20 | |

Skipping Positions

By pressing the **F7** button you can jump to any position of the program. Press the **F7** button before you pick a component. Then you can chose the step from which you want to continue.

Path Optimization

The activation of the path optimization is located in the options menu. Before the process is started, all positions are sorted by their position on the PCB. This way the total path between the single position can be reduced significantly.

Datum Point Optimization

The reference optimization is located in the options menu. It affects the pick & place process and the dispense mode.

This functions skips the repeated input of the fiducials for a new PCB of the same type. This means after finishing a PCB and starting the placement for the next one the program does not ask you for the fiducials.

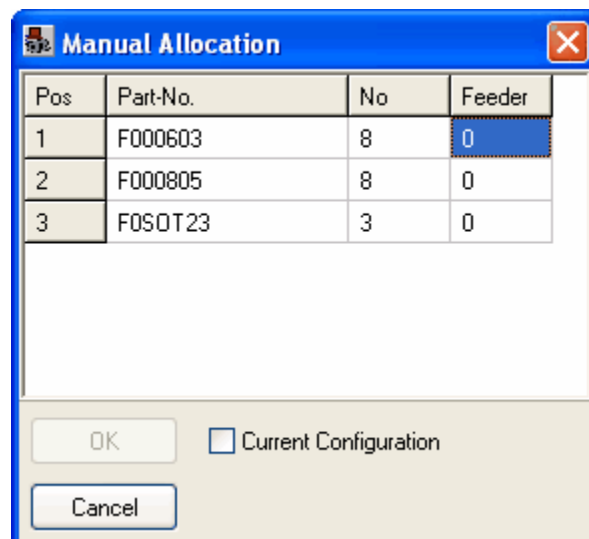
If you decide to use this option with strongly recommend to use a mechanical stopper for the PCB holder.

4.4 Menu Conversion

This menu is only visible, when the active child window contains a converted CAD file.

4.4.1 Manual Allocation

This command opens the dialog for the manual allocation of the feeder numbers. The part numbers and their commonness are shown in the grid.



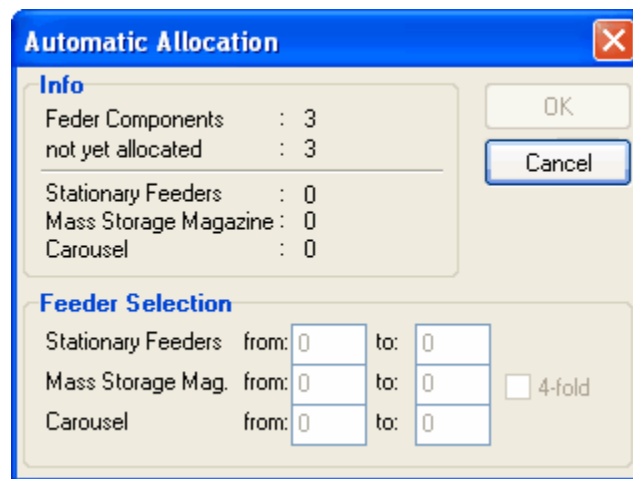
You can now enter the valid feeder number for each position in the column "**Feeder**". You find a description of the syntax for the feeder numbers in the appendix. By activating the checkbox "**Current Configuration**", only that feeder numbers will be accepted, that are contained in the current feeder configuration.

The OK Button will be activated, when all part numbers are assigned to a feeder number.

4.4.2 Automatic Allocation

This menu point is not shown, when using the *Feeder Index*.

This command opens the dialog for the automatic allocation of the feeder numbers. The possible areas of the feeder are shown here, at what only that feeder, that are defined in the current configuration, are activated.



The dialog box titled "Automatic Allocation" has a blue header bar with a close button (X). It contains two main sections: "Info" and "Feeder Selection".

Info

| | | |
|-----------------------|---|---|
| Feder Components | : | 3 |
| not yet allocated | : | 3 |
| <hr/> | | |
| Stationary Feeders | : | 0 |
| Mass Storage Magazine | : | 0 |
| Carousel | : | 0 |

Buttons: OK, Cancel

Feeder Selection

| | | | | | |
|--------------------|-------|--------------------------------|-----|--------------------------------|---------------------------------|
| Stationary Feeders | from: | <input type="text" value="0"/> | to: | <input type="text" value="0"/> | <input type="checkbox"/> 4-fold |
| Mass Storage Mag. | from: | <input type="text" value="0"/> | to: | <input type="text" value="0"/> | |
| Carousel | from: | <input type="text" value="0"/> | to: | <input type="text" value="0"/> | |

Indicate the areas in the feeder selection which you can provide for the automatic assignment now.

After each input, the number of not yet allocated components and the distribution of the components among the feeder are shown in the Area "**Info**".

The OK Button will be activated, when all part numbers are assigned to a feeder number.

4.5 Menu Control

This menu contains all commands for setting up the Semi Auto Pick & Place Machine.

4.5.1 Feeder Coordinates

This menu is used to set the feeder coordinates.

Open

Before a board can be populated the appropriate feeder configuration needs to be loaded, which can be done with this menu point.
The name of the loaded configuration is displayed in the right hand lower corner of the program window.

New

Establishes a new configuration for feeders. Once selected the configuration dialogue box appears.

Edit

With this command an existing configuration can be edited. The conditions correspond with those of „New“.

Reference

Selecting this menu point causes all dynamic feeders (carousels, Mass Storage / Paternoster Magazines) to return to their starting positions (bin or row 1).

4.5.2 Feeder Index

This menupoint is only activated, when the optional feeder index modul is part of your software package.

Together with the feeder coordinates, the feeder index represents the physical feeder configuration of your Semi Auto Pick and Place SM902. To make creating a SMD-File easier and faster, a feeder can be assigned to each component through it's part number.

All informations about the feeder assignments are saved in the feeder index file '*.SDX'. This file contains the part no., the description, the type and the feeder no. of your components. The file name of the actual feeder index is shown at the left side of the feeder coordinates in the status panel at the right, bottom edge of the main window. If the loaded feeder index is not valid, or if there are differences between the SMD and the SDX files, this field will be shown in red colour. By clicking this field with the right button of your mouse, you will enter a popup menu for managing the feeder index.

Open

Loading an existing Feeder Index. The file name of the actual feeder index is shown in the status panel of the main window

New

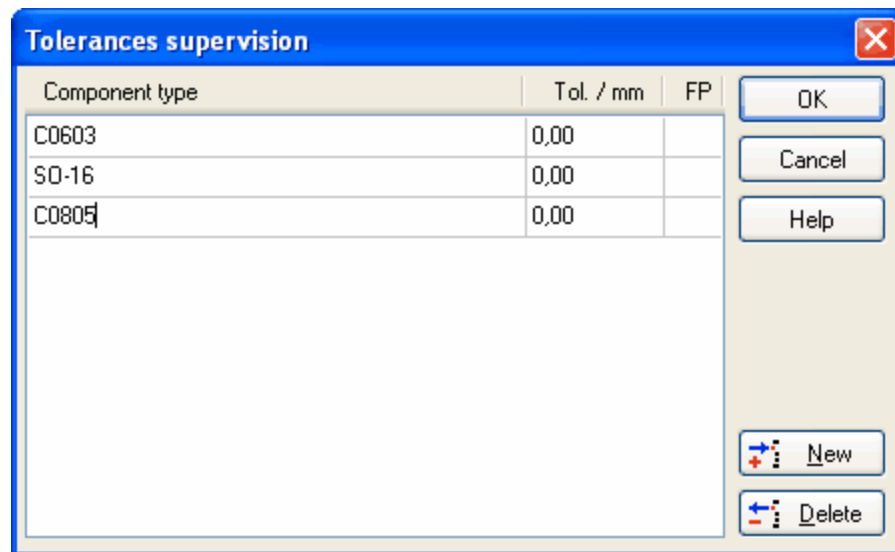
Create an new feeder index file. Opens an edit dialogue with one empty row for entering a new feeder index.

Edit

Opens an dialogue for editing the loaded feeder index.

4.5.3 Tolerance File Supervision

This program function has been developed for the placement and dispensing modes to allow the system to control placement and dispensing position accuracy. To this end a tolerance can be allocated to each component type, which then has to be placed or dispensed within the specified tolerance circle.



Each component type can have a tolerance value associated with it. There is capacity for approximately 65,000 component types. Each data set contains the component name and its tolerance.

Up to 100 characters can be used to describe a component type and is used as a key to link a component with its tolerance. In placement files (*.SMD) each data set contains the field „Component Type“, which determines, together with the Tolerance File, the tolerance to be used for placement or dispensing. The choice of tolerance value depends on several factors. On the one hand the component density on a PCB and on the other the size of a particular component is relevant. Large components, such as PLCCs, can be picked up further away from the component's true centre than small chips. With smaller components it is also easier to stray into the placement position of a neighbouring position than would be the case with a larger device.

If your Semi Auto Pick & Place Machine is prepared for Placing FinePitch Components, you have to mark the relevant Components with an asterisk in the FP-Column, so that the placement file can recognise the Component correctly. During the Pick & Place Prozeß you will be asked to Place the picked Component in the Pre-Location Fixture and place it with the FinePitch Adapter on the PCB. As soon as you mark a Component with an asterisk, the Tolerance of this Component will be set to 0,0.

„Options“ permits a basic ON or OFF setting for Tolerance Supervision.

New

The button „New“ adds a new component type to the end of the list and pre enters default values.

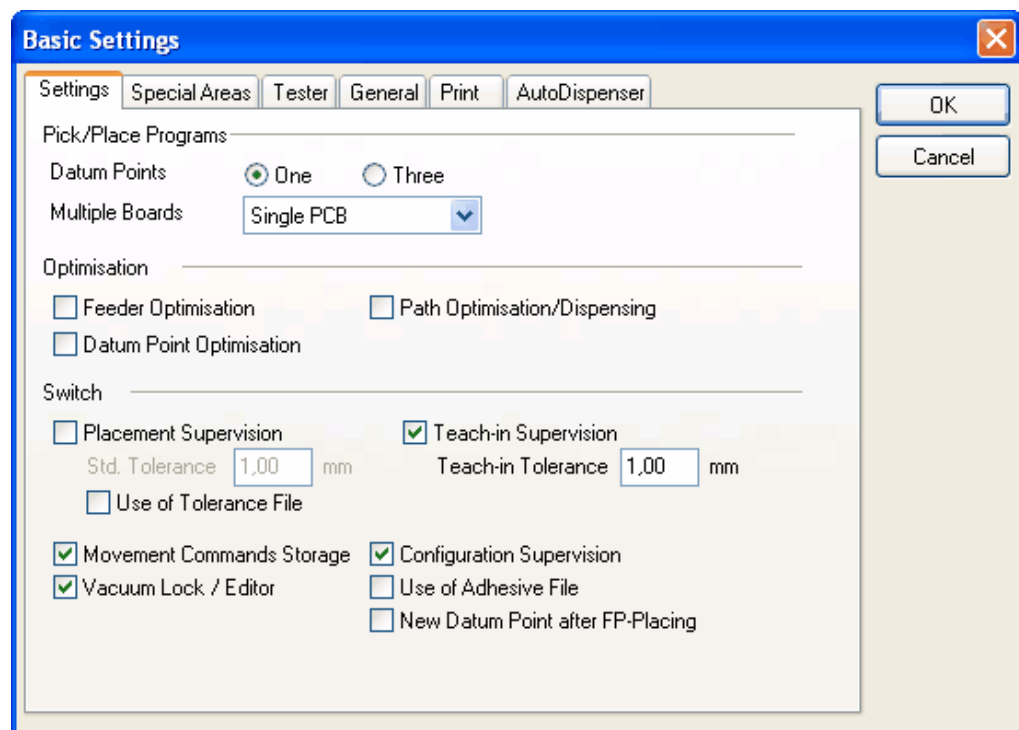
Delete

This button removes the current component type from the list. Should there be an accidental erasure, pressing „Escape“ will exit from the dialogue box without having executed the changes.

4.5.4 Options

The Options dialogue box allows the user to change basic settings in the program. Changes are confirmed with „OK“.

Page Settings



Datum Points

The number of datum points can be specified here. This information is stored with the Pick & Place data and **cannot** be altered subsequently. When a placement file is loaded the datum point information is preferentially taken from the file and not the

Option settings.

Before establishing a placement program the number of datum points needs to be specified, since all positions refer to the datum points and a retrospective change is not possible.

When three datum points have been specified the position of each component is uniquely defined, even with a PCB presented at an angle. Any angular correction is automatically calculated.

With one datum point the board has to be held squarely; a correction of the angle of presentation is not possible.

Multi Boards

The program allows selecting from: no multiple boards, single multiple boards and multiple boards.

Single multiple boards: each section is processed completely before the machine moves on to the next section.

Multiple boards: the whole board is populated simultaneously, ie each component of a particular sort is placed on to all the sections before the machine moves to the next component sort.

This latter method of placement has real advantages for Feeder Optimisation (please see below), since, particularly dynamic, feeders do not have to move on or changed as frequently as in other modes.

Feeder Optimization

Picking & Placing can be speeded up when Feeder Optimization is used.

The placement records are pre sorted according to feeder numbers, so that component removal is simplified and the number of movements of dynamic feeders reduced.

Datum Point Optimization

This function refers to the Pick & Place and Dispense Modes. When activated this function permits the omission of entry of datum point(s) for second and subsequent boards from a batch. The program assumes that the value(s) entered for the first board remain(s) valid for all following ones, which makes it necessary that a mechanical stop be used for the PCBs.

Path Optimization / Dispensing

The application of adhesive can be improved with this function. Data sets are sorted in such a way that the length of the total path traveled to complete a board is reduced to a minimum, thus reducing the operator's workload.

Placement Supervision

Placement Supervision allows the allocation of a tolerance value to each component type and is effective in the Pick & Place and Dispense Modes.



When deactivating the Placement Supervision the placement and dispensing positions will no more supervised. A general deactivation is not recommended.

Please enter in the field „Standard Tolerance“ the maximum deviation from the programmed placement or dispense position you can allow for any component.

With „Use Tolerance File“ component type specific deviations can also be used, which are specified in this file (please see menu command „Tolerance File Supervision“). The value specified in Standard Tolerance is used as a default value, only applied when no specific, component type related, value can be found in the Tolerance File.

Teach-In Supervision

If this option is checked, the program validates if the placement position is not already used by another component. The Teach-In tolerance determines the minimum distance between two components.

Movement Commands Storage

With this function enabled, but only in the Editing Mode, as soon as a feeder number is entered the LED associated with that feeder confirms its selection; in the case of dynamic feeders the selected compartment is also moved to the pick up position. This helps to confirm the correct choice of feeder straight away and also permits the assembly of a board while programming it.

Vacuum Lock / Editor

In the Editing Mode this function can switch the vacuum off, so that no accidental picking up of components is possible.

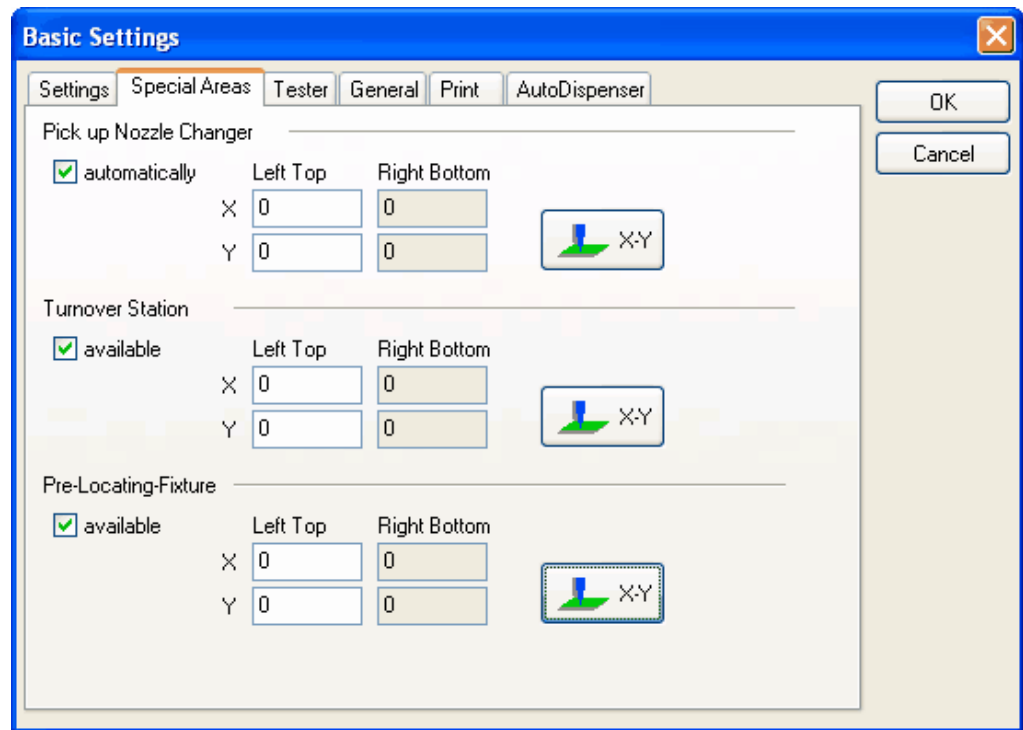
Configuration Supervision

This function only affects the Editing Mode and checks that any specified feeder is part of the currently loaded Feeder Configuration. When a feeder, not defined in the Configuration, is specified an error message is displayed. This option should be deactivated if a program is being prepared without needing to refer to available feeders.

Use Adhesive File

Only relevant to Dispense Mode. When dispensing adhesive the dots defined in the Adhesive File can be processed. This function should remain deactivated while the option „Application of Adhesive Dots“ is not available.

Page Special Areas



Pick Up Nozzle Changer

If the Pick Up Nozzle rack is to be recognized by the system, this option needs to be activated.

In order for the program to distinguish the exact position of the Nozzle Rack, its area has to be defined with the placement head. The top left hand and then the lower right hand corners are in turn registered by using the „Acquire X/Y Position“ button.

Flipping Station

The optional Component Turn Over Station can also be automatically recognized by the software.

Here, too, the area needs to be specified. (See Pick up Nozzle Changer).

Pre-Location-Fixture

Before placing a FinePitch-Components on the PCB it has to be placed in the Pre Location Fixture, to pick them up with the FinePitch Adapter (Spezial Edition of the Semi Auto Pick & Place Machine with two arms and X-Y-Micrometers for fine Adjustment). Here, the area needs to be specified (See Pick up Nozzle Changer).



This area is only activated if the FinePitch module is activated.

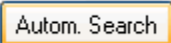
Page General

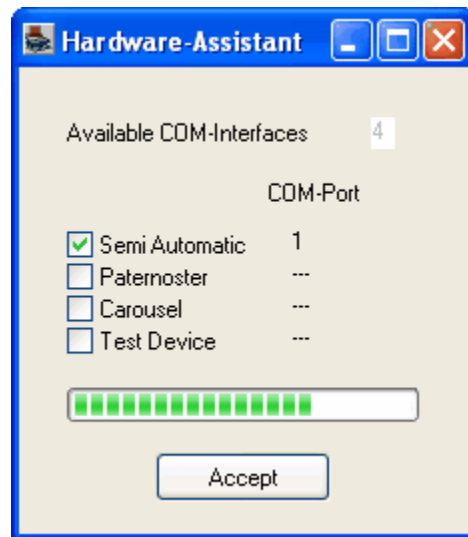
The screenshot shows the 'Basic Settings' dialog box with the 'General' tab selected. The 'Interface Ports' section contains five dropdown menus: 'Semi Auto PP M/c' (COM1 -> Semi Auto M/c), 'Mass Storage Magazine' (COM3 -> Mass Storage M), 'AutoDispenser' (<No Interface>), 'AutoDisp. Control' (<No Interface>), and 'Tester' (<No Interface>). An 'Autom. Search' button is located to the right of these dropdowns. The 'Settings' section includes a 'List of recently used files' text box with the value '4', a 'Unit' section with radio buttons for 'mm' (selected) and 'Zoll/100', and two checked checkboxes: 'Create Backup Files' and 'Complete Autom. Position'. There is also an unchecked checkbox for 'Activation of Debug Mode'. 'OK' and 'Cancel' buttons are on the right side of the dialog.

Interface Ports

On this tab the interface ports to connect the external machines are specified. In the drop down fields only by Windows recognized ports are available. If any installed port is missing it indicates that this port has not been recognized by Windows properly.

The interface ports for the SM902, the mass storage magazines and the optional tester are recognized by the automatic search. The two interface ports for the optional AutoDispenser must be specified by yourself.

When you press  the following dialogue opens:



All available interface ports are scanned automatically. The number of recognized ports can be seen in the grayed out field. When the progress bar is full, all ports have been scanned. The checked check boxes show the found machines together with the port number on which the machine was found. After the successful scan press on the Accept button to save the found settings. After that a software restart is necessary.

List of last opened files

The maximal number of files listed in the Quick Open Menu can be set here (up to 9).

Units of Measure

Coordinates and other measurements can be displayed in units of mm or 1/100 Inch.

Create Backup Files

With this option activated, every time a file is changed, a back up copy of the old file is automatically made. We recommend that this option is activated.

Complete Autom. Position

This option refers only to the Editing Mode. When active, this function tries to complete fields of placement records in the Teach Mode. If, for example, a component that was used before is entered the software will automatically enter the previously known feeder number in the appropriate field.

Activate Debug Modus

Activating this mode will, next time, start the program in the Debug Mode. Detailed information can be found in appendix Debug Window.

Page Tester

On this page the settings for the component tester, the teststation and the handling of the test results will be carried out.



This page is only available if you have the Tester module activated.

Activate Tester

Switches the software test modus on/off and checks the addressed component tester to be connected and working. If the tester is not activated, all other fields will be enabled.

Teststation

Controls the using of the FRITSCH-Teststation (available as attachment).

Automatic Test

This Point is only eligible combined with using the teststation. If it is checked, the component test will be started automatically after inserting the component in the FRITSCH-Teststation (connecting and testing the component).

Complete Protocol

With this, a test protocol with a list of all good and bad components will be printed after completing a PCB (Details for test protocol see below).

Error Protocol

With this, only the outranged components will be printed in the list.

The printing of a test protocol can be switched off completely (now kind of protocol selected), or one of the two types of protokol is selected.

The test protokol contains following informations:

- Print Information, if this is activated in the option dialog 'Print'.
- Date and time of printing
- PCB infos from the properties of the SMD file: PCB, project and company
- commentary from the SMD file
- Component info: Feeder, ID-No., Part-No., desired value, actual value, unit, divergence, good (yes/no/?), placed (yes/no)
- PCB complete or pick & place aborted.

Placing outranged Components

Here you can select, whether the user is allowed to place components, which are tested bad (value out of range).

Always append to existing Testfile

Here you can choose if you want to continue an existing testfile or overwrite the old one.

Ask for Filename

When checked you will be asked for a filename for the testfile.



If you do not choose a file name the standard file name is used!
If the option **Always append to existing Testfile** is deactivated, the program overwrites an existing file!

Tester

Here you can choose your model from the list of available component tester.

Test File

Here you can choose the standard testfile, that will be used, when the following point (individual) is not checked, or the testfile with the same name as the SMD file is not found. Using the button with the folder open symbol, you will get to an file open dialog.

Individual

If you want to use a separete test file for each PCB (SMD file), please check this point. The standard test file will then be used only, when the program cannot find your file.

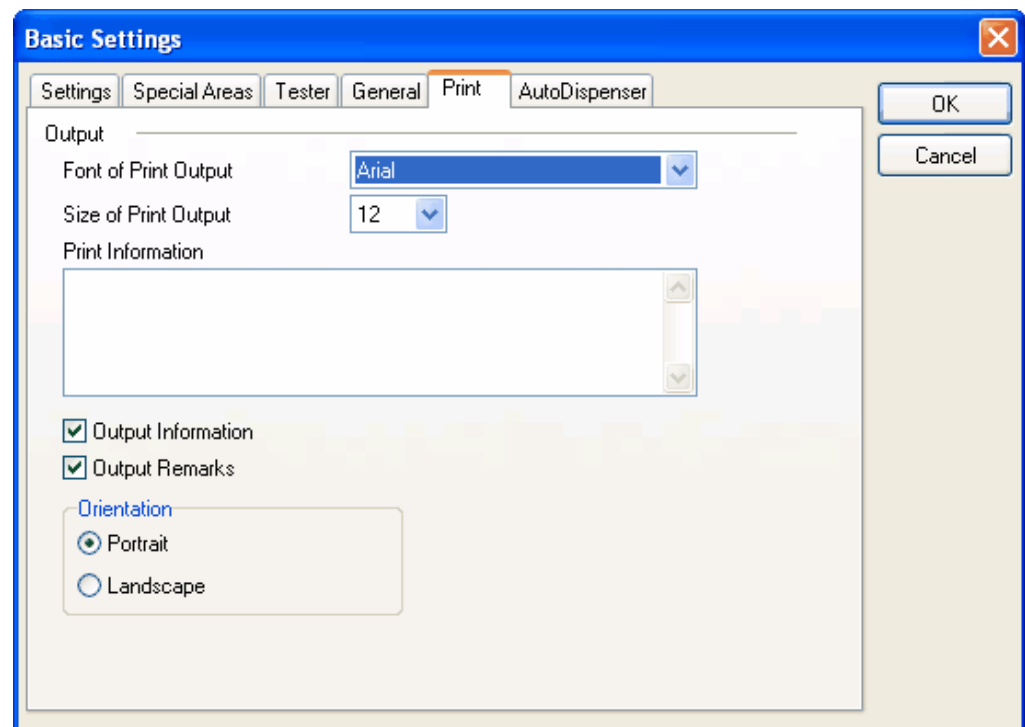
Test Area

In order for the program to distinguish the exact position of the teststation, its area has to be defined with the placement head. The top left hand and then the lower right hand corners are in turn registered by using the X-Y button.

Dropping Area

If the value of a component is outranged, you can either place it or put it back in the feeder or throw it away. In order for the program to distinguish the exact position of the dropping area, this has to be defined with the placement head. The top left hand and then the lower right hand corners are in turn registered by using the X-Y button.

Page Print



This page is intended solely for specifying the printer output of lists.

Font & Size

Here the font and print size for lists can be specified.

Print Information

The text entered here is printed at the head of all lists, while „**Info Output**“ is activated. This field can, for example be used to show your company, department or job details.

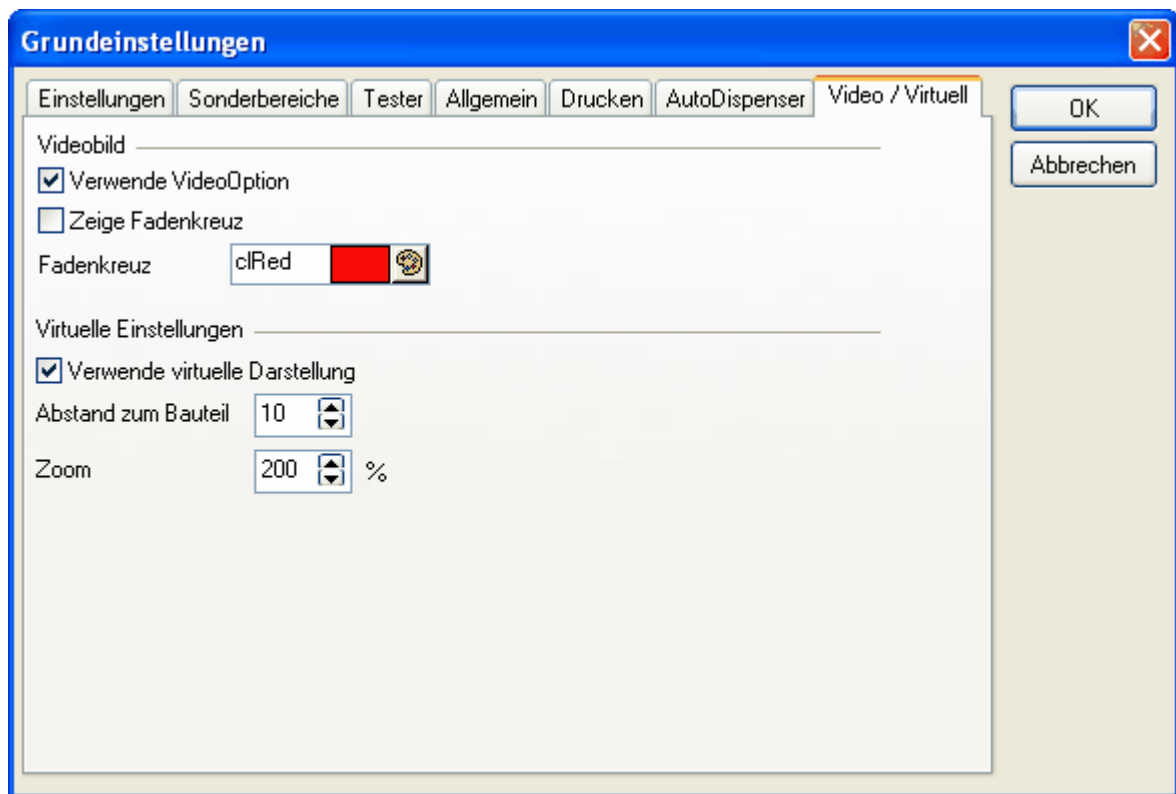
Print Comments

When this field is active the comments recorded against a particular placement file will be printed together with the list.

Orientation

You can choose if you want to print in portrait or landscape format. Landscape is a good choice if you have very long component names.

Seite Video/Virtuell



Auf dieser Seite werden die Einstellungen für das Videobild und die virtuelle Darstellungen vorgenommen.

Verwende VideoOption

Damit kann die Option zur Darstellung eines Videobildes aktiviert bzw. deaktiviert werden.

Zeige Fadenkreuz

Damit kann ein Fadenkreuz über das Bild gelegt werden.
Über die Farbpalette kann die Farbe des Fadenkreuzes eingestellt werden.

Verwende virtuelle Darstellung

Mit dieser Option kann die virtuelle Darstellung aktiviert bzw. deaktiviert werden.

Abstand zum Bauteil

In diesem Feld wird der Abstand zur Zielposition eingegeben, ab dem der Zoom aktiviert wird. Je kleiner der Wert ist, umso mehr muss man sich dem Bauteil angenähert haben, bis in die Zoomansicht gewechselt wird.

Zoom

Hier wird festgelegt, wie stark der Zoom sein soll. Die Angabe erfolgt in Prozent. 100% entsprechen keinem Zoom, 200% wären eine Verdopplung.

4.5.5 CAD-Setup...

The rules for the CAD conversion are defined in the CAD setup dialogue.

| Parameter | Column |
|-------------------|--------|
| Part Number | 2 |
| Description/Value | 0 |
| ID-No. | 6 |
| Package | 0 |
| Rotaion | 5 |
| X-Position | 3 |
| Y-Position | 4 |
| Layer | 0 |
| Marker | 0 |

Filename

Here you can chose a filename for your conversion template.

Remark

Here you can write a comment to your conversion template.

Update Feeder Index

This checkbox is only visible, when the feeder index module is part of your software package. Here you select, whether new component-feeder assignments are overtaken into the feeder index.

Comment form Line ... to Line

When your CAD file contains previous text (information or hints), you may enter the lines here, to take them over as comment for the SMD file.

Field Separator

Enter the ASCII code of that character that separates the columns in your CAD file. If you don't know the ASCII code of this separator, you can open a dialog which contains a selection of possible characters by clicking the button next to the editor field.

Starting Line for Conversion

Here you specify in which line the placement data starts.

Field End Characters

When your CAD file contains a unique character string as end of file marker, you can enter this string here. Please take care, that the string you enter here is accurate the same as in your file, considering all space characters and capitalization.

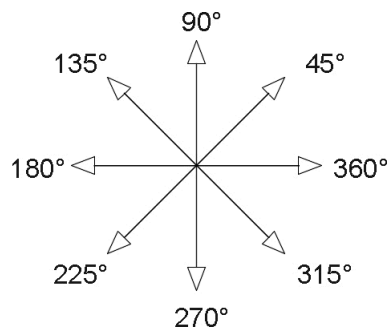
Units

In this list box you can choose the unit of the Component Positions.

Rotation Offset

To compensate rotation differences between your CAD system and the FRITSCH Semi Automatic SM902, you can choose an offset of 90°, 180° or 270°.

FRITSCH Halbautomat SM902:



Zero Rotation = 360°

When your CAD system indicates the angle 0° as Rotation 360° (e.g. HSI80), activate this checkbox.

Rotate Clockwise

When your CAD system rotates the polarities clockwise, activate this checkbox.

Symbol for Toplayer / Bottomlayer

Enter here the character(s), that mark the top- respective the bottom side data.

Marker for Pick and Place Data

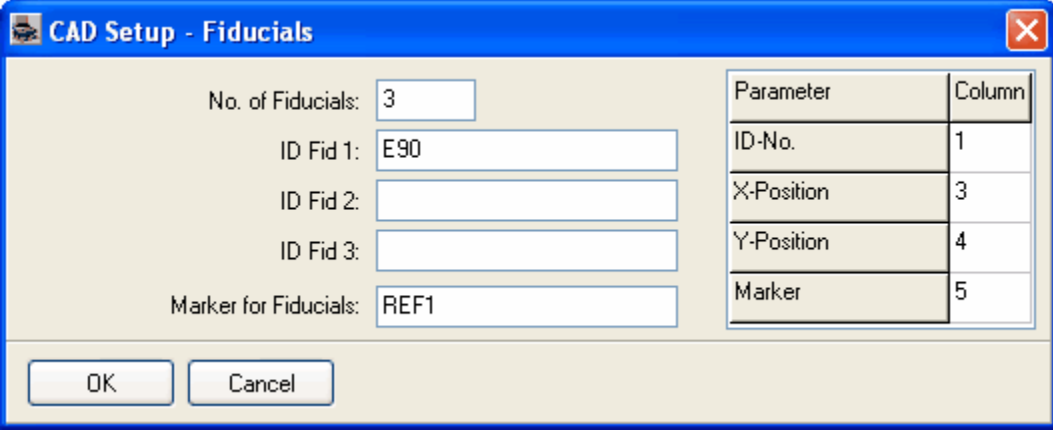
When the lines, containing relevant PP data, are signed with unique characters, you can enter them here. This accelerates the conversion of large files, that contain more information than needed for conversion (e.g. Mentor). Please note, that you also have to enter the column of this marker in the parameter grid.

Skip IDs

When your CAD file contains positions, which shall not be converted (drills, test points, conventional components etc), you can enter their IDs here

Fiducials

With this button you can open the dialog for setup the fiducial point overtaking.



The dialog box 'CAD Setup - Fiducials' contains the following fields and a table:

- No. of Fiducials: 3
- ID Fid 1: E90
- ID Fid 2:
- ID Fid 3:
- Marker for Fiducials: REF1

| Parameter | Column |
|------------|--------|
| ID-No. | 1 |
| X-Position | 3 |
| Y-Position | 4 |
| Marker | 5 |

Buttons: OK, Cancel

Number of Fiducials

When your CAD file contains no fiducials, enter 0. All component positions are then related to 0. Otherwise enter the number of fiducials (only 1 or 3 are possible) and fill up the ID-descriptions in the editors below.

Marker for Fiducials

When the lines, containing relevant fiducials, are signed with unique characters, you can enter them here. This accelerates the conversion of large files, that contain more information than needed for conversion (e.g. Mentor). Please note, that you also have to enter the column of this marker in the parameter grid.

Parameter

In this grid you can enter, in which column of your CAD file the apart coordinates of the fiducials are included. Please note, that each field separator, that is found during the conversion, will be interpreted as a new column.

Parameter

In this grid you can enter, in which column of your CAD file the apart PP informations are included. Please note, that each field separator, that is found during the conversion, will be interpreted as a new column:

"C001;;;C0805;...." -> Column 1: "C001"
 Column 2: empty
 Column 3: empty
 Column 4: "C0805"
 ...

PCB Bottom Side

Many CAD systems save the positions of the bottomlayer by looking through the topside of the PCB. But for pick and place you have to turn the PCB, so the coordinates and polarities get inverted. With the options "**Invert X-Data**", "**Invert Y-Data**", "**Invert X-Rotation**" and "**Invert Y-Rotation**" you define, how these PP data have to be converted.

4.5.6 Authorization

This command switches between the two access levels. While this option is not activated changes to the main program, placement files and settings are not allowed. This protects the program from unintentional changes and allows them only when initiated by authorised persons. The limited access mode can be further protected with a password (please see „System Password“).

4.5.7 Settings

Language

The language used for the operator interface can be selected here. All messages, menu points and descriptions are then displayed in the selected language.

System Password

With this password changes in authorization level can be protected, so that only authorized persons can make changes.

AutoDispenser Calibration

This function is used to calibrate the dispensing nozzle of the AutoDispenser. Selecting the command „**Dispensing Nozzle**“ starts the calibration process, which is continued by a message requesting to move the AutoDispenser to a suitable

location for a test dot. An old PCB is ideal for this purpose. Confirmation initiates the dispensing of a test dot. The Datum Pin is then lowered into the center of the dot and this position confirmed. The value thus established is recorded and will be used from then on.

The command „**Drawing Pen**“ is intended for demonstration purposes. At exhibitions or similar occasions the AutoDispenser can be used with a Drawing Pen. Since a pen has different dimensions to those of a syringe a different distance between it and the Datum Pin has to be registered.

Dispensing

This button is used to switch off the dispensing function of the AutoDispenser. This can be useful when trouble shooting or setting up so that no actual dispensing takes place when the AutoDispenser goes through its motions.

Mechanism

The mechanism of the AutoDispenser can be switched off. This helps, again, to simplify in isolating different functions in fault finding and set up.

Drawing Pen

This menu point is activated when the Drawing Pen is to be used for demonstration purposes.

4.6 Window

This menu contains commands exclusively affecting displayed windows.

Cascade, Tile Vertically, Tile Horizontally, Arrange Symbols, Reduce Window

These commands allow automatic adjustments to opened windows and are identical to standard Windows commands.

4.6.1 Debug Window

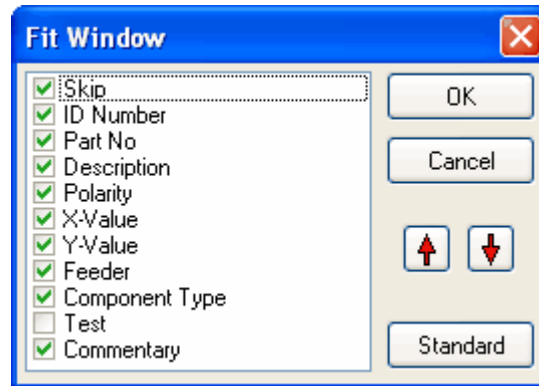
This button is only visible when the program was started in the Debug Mode. The command makes the Debug window appear and disappear.



This button does not stop the debug mode. This is only possible in the option menu.

4.6.2 Window Adjustment

With this command the columns of the file window can be adjusted.



In the selection list the order of columns can be altered. In addition individual columns can be hidden, although values in hidden columns remain available. The button „**Standard**“ allows the display to revert to the factory default settings.



Column width can be altered directly from the file window.

Chapter



V

5 Appendix

The final part of the handbook contains additional information about the SM902 and is intended to complement several points in the main instructions. More detailed aspects of the principles of the software are also outlined here. This is mainly intended for supervisory personnel.

5.1 Feeder

The software links the feeder numbers with the details of actual feeders. In principle, the software differentiates between two different feeder types:

- Stationary Feeders: Tape Feeders, Stick Feeders etc.
- Dynamic Feeders: Carousels, Mass Storage Magazines (Paternoster)

5.1.1 Stationary Feeders

All feeders, not motor driven, are treated by the program as Stationary Feeders. This, for example, includes containers for loose components, Stick Feeders and Tape Feeders.

Stationary Feeders are addressed with consecutive numbers in the range **1 to 299**.

The sequence of numbers follows the physical arrangement around the machine. Normally, number 1 starts with the first feeder at the left front of the machine and continues through the first one on the rear Mounting Rail.

The feeder LEDs can be freely allocated from the configuration dialogue. Any deviation from the standard arrangement should only be contemplated in exceptional circumstances.

| | | |
|-------|-------|-------|
| 61203 | 61202 | 61201 |
| 61103 | 61102 | 61101 |
| 61003 | 61002 | 61001 |
| 60903 | 60902 | 60901 |
| 60803 | 60802 | 60801 |
| 60703 | 60702 | 60701 |
| 60603 | 60602 | 60601 |
| 60503 | 60502 | 60501 |
| 60403 | 60402 | 60401 |
| 60303 | 60302 | 60301 |
| 60203 | 60202 | 60201 |
| 60103 | 60102 | 60101 |

For matrix feeder the addressing is as follows:

6ZZSS

6: Address for the identification as matrix feeder

ZZ: Line of the matrix

SS: Column of the matrix

Examples:

60101: Feeder in line 1 column 1

60502: Feeder in line 5 column 2

5.1.2 Dynamic Feeders

In order to cover all the requirements of industrial and laboratory use up to five Dynamic Feeders can be used simultaneously on one machine. Each feeder is addressed with a number 1 to 5, which is set at the factory. This number always appears as the first digit in any bin location reference.

Carousel

The Carousel Drive is available with a variety of different Carousels, eg with 45, 66 and 90 different containers. Each container has a number allocated to it from the range 1 to N (eg 1 to 90).

The address of a Carousel container follows this pattern:

APPDD

- A:** Address of the Carousel Drive (factory set from 1 to 5)
PP: Position number of the container. This position **must** be entered with two digits.
DD: These two figures are used for Carousel changes.
 If more than one Carousel is to be used for a particular assembly different ones can be identified with these two numbers. This means that up to 100 Carousels could be used for one assembly.

Paternoster (Mass Storage Magazine)

The Paternoster, essentially, consists of an endless tape with corresponding containers that are addressed by specifying their row and column numbers. Each feeder number conforms to the following

AZZSS

- A:** Address of the Mass Storage Magazine (factory set from 1 to 5)
ZZ: Row number from 1 to 42. This position **must** be entered with two digits.
SS: Column number.

The containers are divided into the following designs:

- **Single container** (Art.-Nr. CS.0002.0): 12 containers per rail (12 Pos.)
- **Double container** (inquire): 3 containers with 2 shelves per rail (6 Pos.)
- **Fourfold container** (Art.-Nr. CS0001.0): 3 containers per rail (3 Pos.)
- **Sixfold container** (inquire): 2 containers per rail (2 Pos.)
- **Twelvefold container** (inquire): 1 container per rail (1 Pos.)

The Column numbers for the different container designs are set as follows:

- **Single container** are addressed with numbers **1 to 12**
- **Double container** are addressed with numbers **21 to 26**
- **Fourfold container** are addressed with numbers **41 to 43**
- **Sixfold container** are addressed with numbers **61 to 62**
- **Twelvefold container** are addressed with number **99**

5.1.3 Examples

Paternoster Address I

| | |
|---------------------------------------|--------------|
| Row 10, Column 5, single container: | 11005 |
| Row 15, Column 2, fourfold container: | 11542 |
| Row 20, twelvefold container: | 12099 |

Carousel Address 2

Container No. 24

22400

Container No. 15 with Carousel change

21502

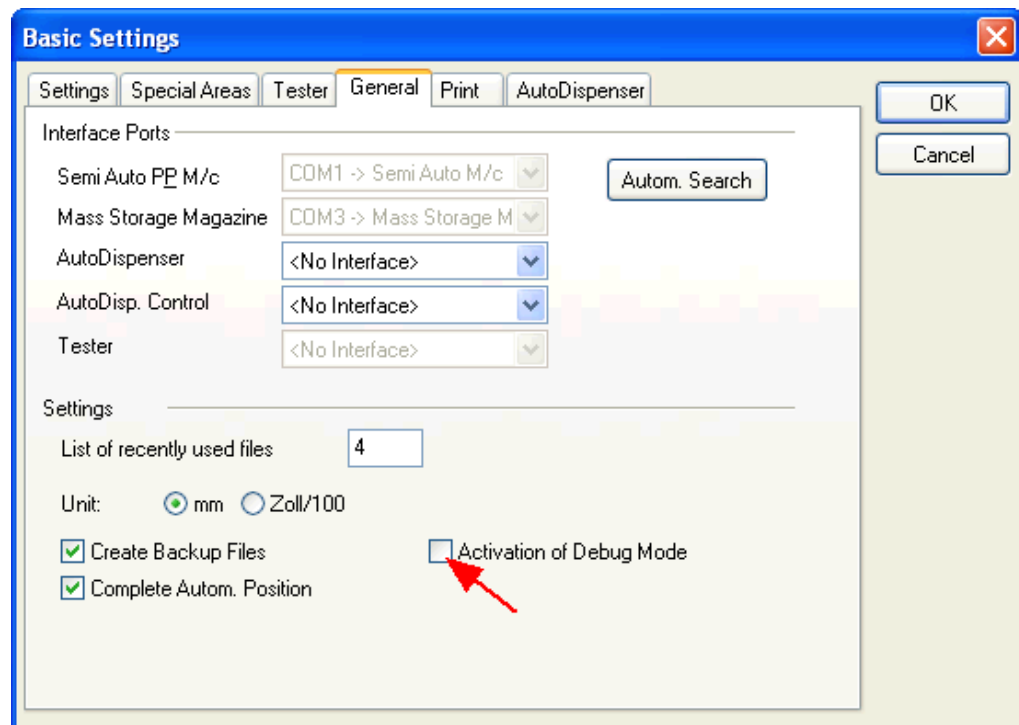
5.2 Debug Window



The debug mode is exclusively for error diagnostics of the program. It is strongly recommend to not use it in daily use.

If errors occur during picking and placing which are suspected to originate from hardware or mechanical defects the program can be started in the Debug Mode. The values indicated will make any search for errors much easier.

The Debug Mode is activated from the Options Dialogue. Activation and deactivation can only be initiated by starting the program afresh.





The debug mode interacts strongly with the program. The data in the debug window is refreshed periodically. This reduces the execution speed of the program drastically. Deactivate the debug mode as soon as you do not need it anymore.



Closing the debug window does not stop the debug mode!

The displayed values correspond to the machine sensors. The two positions refer to the datum point.

Debug Window

Semi Auto M/c

| | | | |
|---------------|-------|------|------|
| Locator Arm | 0,00 | 0,00 | Free |
| PE Head | -0,76 | 3,74 | |
| Sensor,top | Yes | | |
| Sensor,bottom | No | | |
| Vacuum | No | Free | |
| Feeder | Off | | |
| Polarity | Off | | |

AutoDispenser

Sensor,bottom AD1

Top

Tester

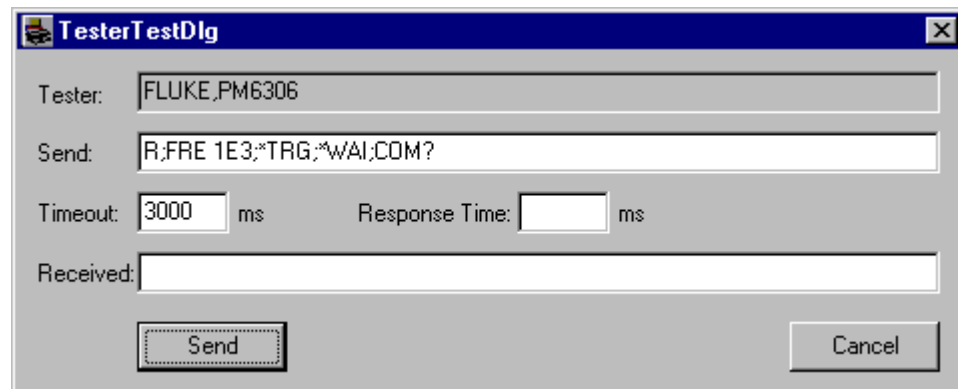
Teststation

Sensors S1 S2

☐ Test Teststation

The screen buttons „Down“ and „Up“ can be used to operate the AutoDispenser .

The screen button „Test“ opens a dialogue for testing a connected component tester. This button is only activated, when the module "Tester" is part of your software package and when the tester is connected to a interface of your PC.

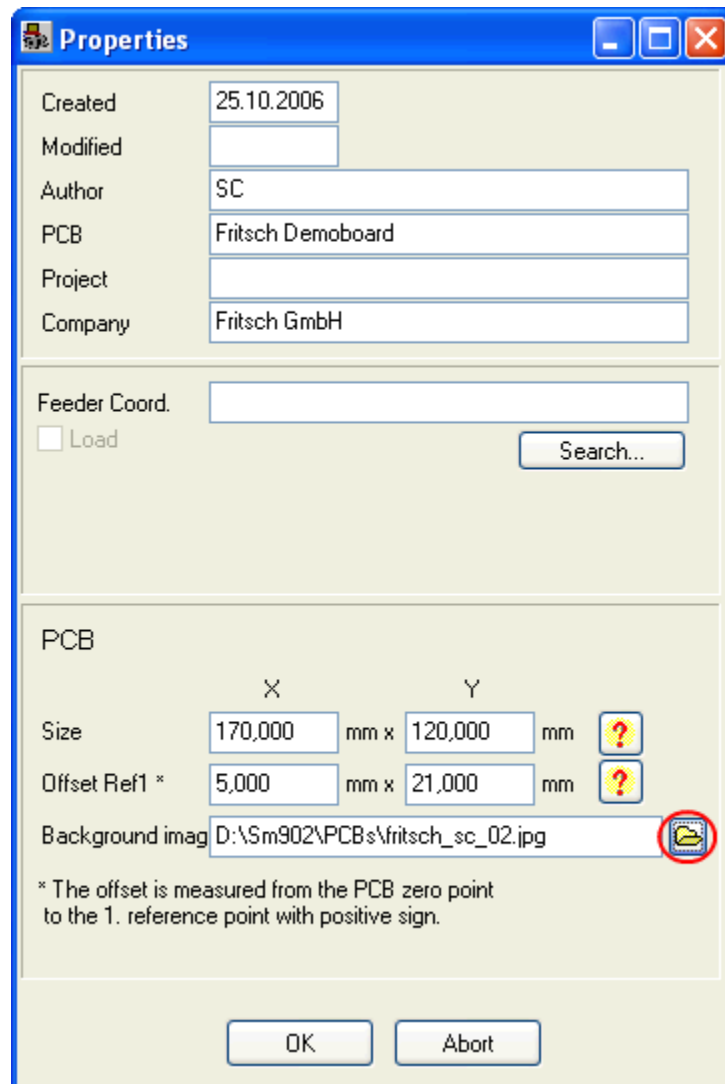


For help with hardware and mechanical errors we recommend to contact a member of the service team at Fritsch GmbH.

5.3 Image Editor

With the image editor it is possible to define a background image for the SM902. Therefore an image is loaded and if necessary rotated or cropped. The background image is then used instead of the green background while in production mode.

The image editor is opened by the properties dialogue in the file menu.



The image shows a 'Properties' dialog box with a blue title bar and standard Windows window controls. It is divided into several sections. The top section contains fields for 'Created' (25.10.2006), 'Modified' (empty), 'Author' (SC), 'PCB' (Fritsch Demoboard), 'Project' (empty), and 'Company' (Fritsch GmbH). Below this is a 'Feeder Coord.' section with an empty text field, a 'Load' checkbox, and a 'Search...' button. The 'PCB' section follows, with 'Size' (170,000 mm x 120,000 mm) and 'Offset Ref1 *' (5,000 mm x 21,000 mm) fields, each with a help icon. The 'Background imag' field shows the path 'D:\Sm902\PCBs\fritsch_sc_02.jpg' and has a file explorer icon circled in red. A note at the bottom explains the offset measurement. 'OK' and 'Abort' buttons are at the bottom.

| | |
|----------|-------------------|
| Created | 25.10.2006 |
| Modified | |
| Author | SC |
| PCB | Fritsch Demoboard |
| Project | |
| Company | Fritsch GmbH |

Feeder Coord.

☐ Load

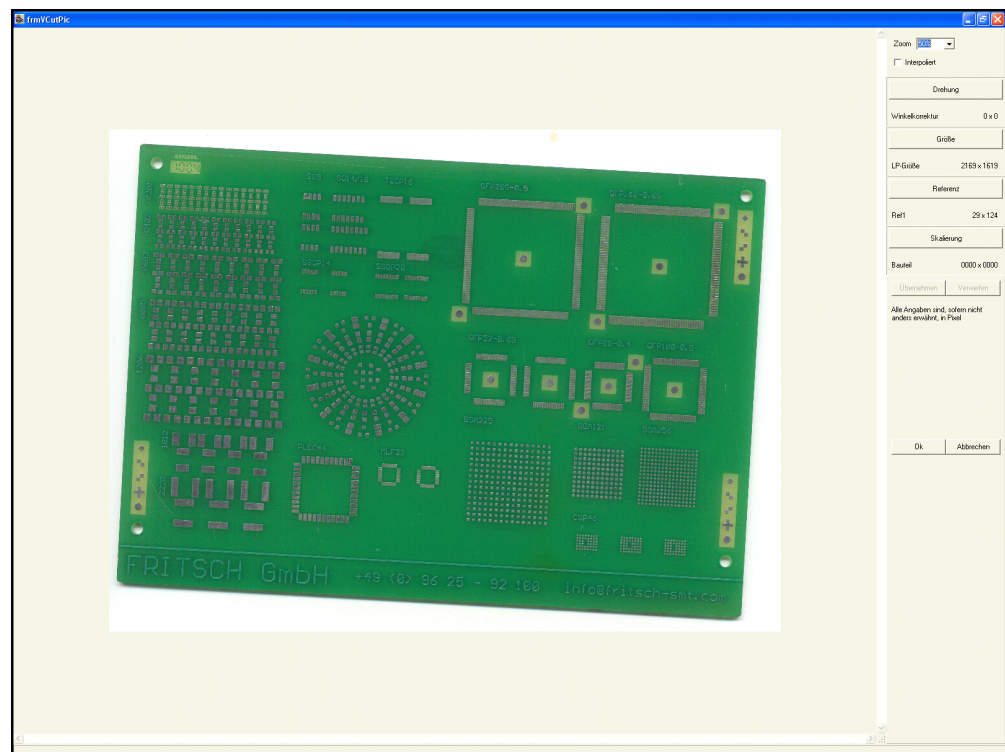
PCB

| | X | | Y | |
|---------------|---------|------|---------|----|
| Size | 170,000 | mm x | 120,000 | mm |
| Offset Ref1 * | 5,000 | mm x | 21,000 | mm |

Background imag

* The offset is measured from the PCB zero point to the 1. reference point with positive sign.

Via the file dialogue the desired background image can be loaded. Afterwards the the window for editing the image will be opened.

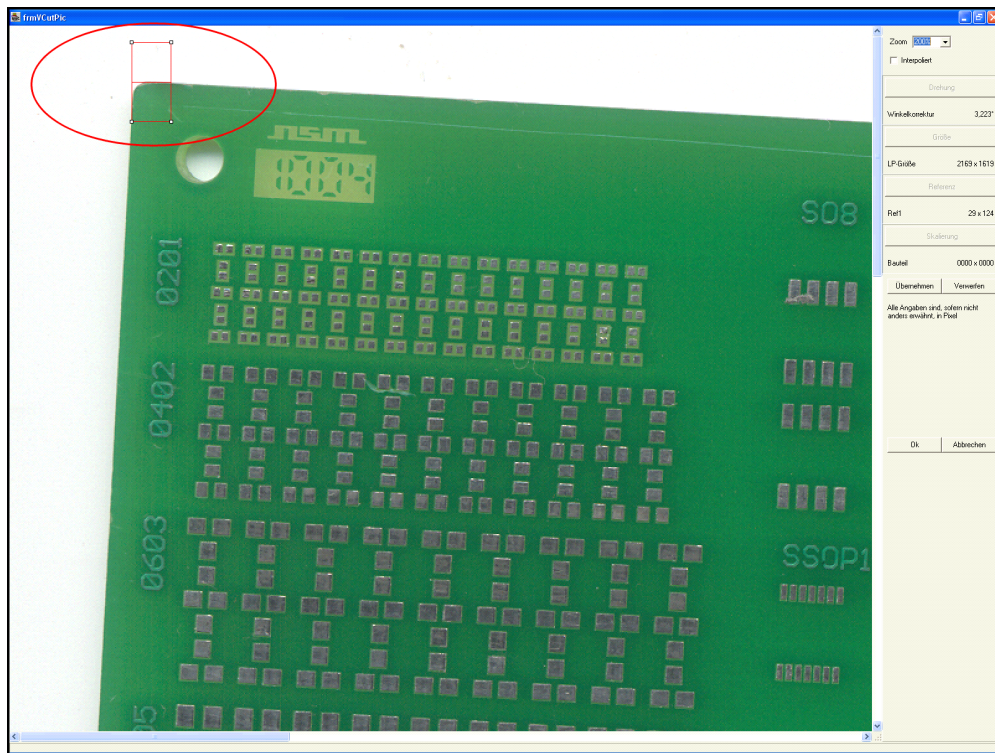


On the right panel are the buttons to manipulate the image.

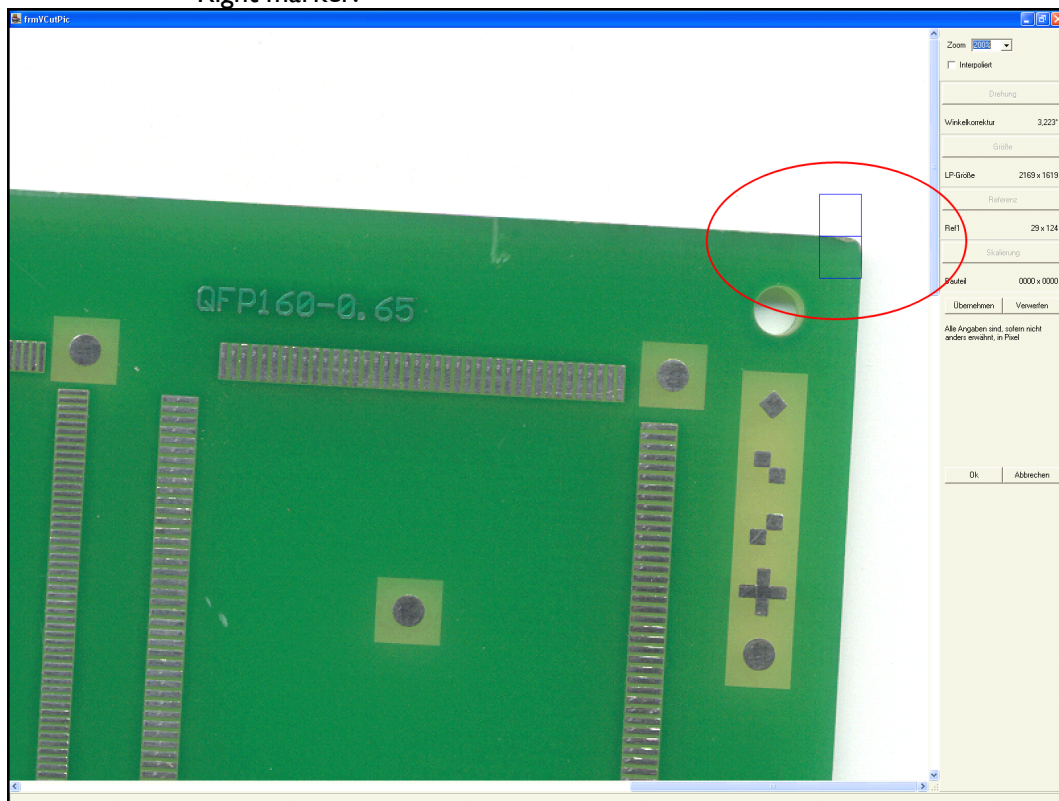
5.3.1 Rotation

In order to rotate the image two markers are moved along the horizontal line.

Left marker:



Right marker:



After moving both markers along the real horizontal line the change is taken over by

pressing Accept.

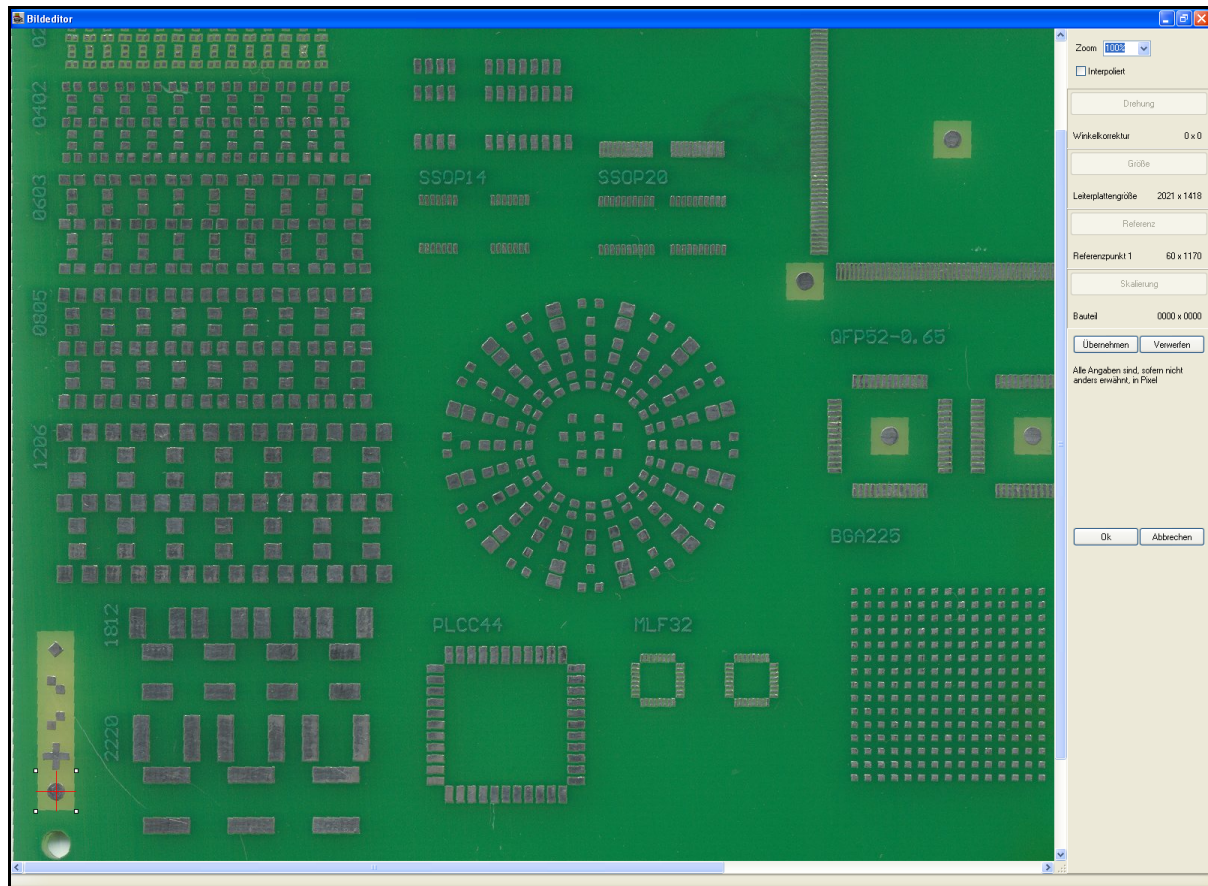
5.3.2 PCB Size

The PCB Size is calculated similar to the angle correction. The two markers are moved in the upper left and lower right corner. With Accept the image will be cropped.

5.3.3 Fiducial Point

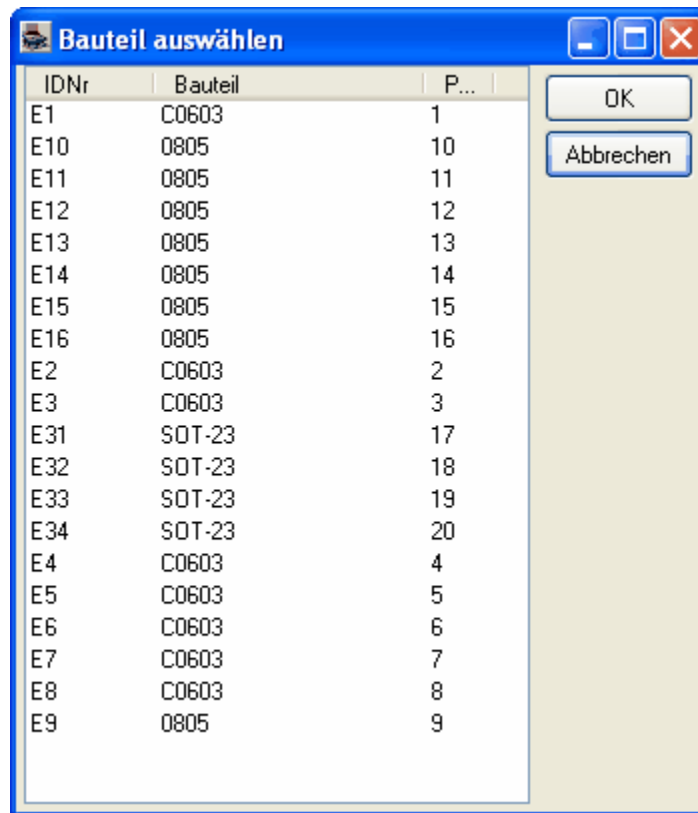
Referenz

Here you specify for the virtual view where the fiducial point on the PCB is located. Therefore move the cross hair to the position of the image, where the fiducial point is located. Save the position by pressing Accept.



5.3.4 Scaling

When you press the button "Scaling" the following window appears:



Choose one of the listed parts. Ideally one that is relative far away from the first fiducial point. Accept the part by pressing "OK".

The image with the PCB will appear together with a cross hair on it. Move the cross hair to the position, where the chosen part of the previous dialog is located on the PCB. The cross hair should be located at the center of the component.

The position will be saved by pressing "Accept". The scaling factor will then be calculated from the position of the fiducial point and the component position.